

Chapter 3 — Affected Environment

In this Chapter:

- Existing natural environment
- Existing human environment
- Protected resources

This chapter describes the existing environment that may be affected by the alternatives. Each section describes a specific resource. The natural environment is discussed first, then the human environment.

Segments A through F, described in Chapter 2, *Alternatives*, and shown on Map 2, *Alternatives*, are used in most, but not all, of the resource discussions to help describe the existing environment.

3.1 Water Resources

3.1.1 Precipitation

Weather patterns in central Washington vary greatly with topography. Most of the study area is in the rain shadow of the Cascades, which results in a semiarid climate. Most precipitation in the study area falls as rain, with as little as 7 to 8 inches of precipitation per year at lower elevations. The amount of sediment in streams varies seasonally, and streams and rivers carry the most sediment when rain or snowmelts occur. Occasional intense summer rains also raise flows and the amount of sediment in rivers and streams.

3.1.2 Watersheds

River basins crossed by the project are the Central Columbia and Yakima. Within these basins the streams crossed by the line segments fall into five watersheds: the Lower Yakima, Upper-Columbia-Priest Rapids, Lower Crab, Upper Yakima, and Upper Columbia-Entiat. Some of the **perennial streams** crossed include Lower Crab Creek, Naneum Creek, and Wilson Creek, in addition to the Columbia River. See Map 4, *Water Resources*. Many smaller perennial and **intermittent stream** drainages and irrigation ditches may also be crossed. Table 3.1-1, *Potential Stream/Lake Crossings*, shows the stream crossings for each line segment and the associated watersheds.

➡ For Your Information

Perennial streams are streams that flow throughout the year, and **intermittent streams** are streams that flow only seasonally.

**Table 3.1-1
Potential Stream/Lake Crossings**

		Watershed				
		Lower Crab	Lower Yakima	Upper Yakima	Upper Columbia Priest Rapids	Upper Columbia Entiat
Perennial Stream Crossing	Segment A					
	Caribou Creek			■		
	Coleman Creek			■		
	Cooke Canyon Creek			■		
	Naneum Creek			■		
	Schnebly Creek			■		■
	Wilson Creek			■		
	Parke Creek – Upper Yakima			■		
	Cave Creek – Upper Yakima			■		
	Segment B					
	Columbia River					■
	Johnson Creek					■
	Middle Canyon Creek					■
	Segment C					
	Alkali Creek				■	
	Cold Creek		■			
	Corral Creek				■	
	Hanson Creek				■	
	Johnson Creek					■
	Middle Canyon Creek					■
	Segment D					
	Cold Creek		■			
	Columbia River				■	
	Lower Crab Creek	■				
	Segment E					
	Columbia River				■	
	Lower Crab Creek	■				
	Nunnally Lake	■				
	Saddle Mountain Lake				■	
	Segment F					
	Columbia River				■	
	Lower Crab Creek	■				
	Nunnally Lake	■				
	Saddle Mountain Wasteway					■

The study area lies at the western edge of the Interior Columbia Basin. The area lies in the rain shadow of the Cascade Mountains, and thus receives very little precipitation. With the exception of the Columbia River, which bisects the study area, water is scarce. Streams are generally small and intermittent. The northern part of the study area near Ellensburg and including Segment A drains into the Yakima River. The remainder of the project (Segments B, C, D, E, and F) contains a number of local drainages that drain directly into the Columbia River.

The streams crossed in Segment A are all part of the Wilson-Naneum Creek sub-basin, a part of the Yakima basin. All streams in this sub-basin are heavily diverted on the Kittitas valley floor and have been channelized into an intricate drainage\irrigation system. There are over 200 unscreened diversions in this drainage (WDFW, 2001). Grazing and other agricultural practices extensively impact the riparian zone of the valley portions of these streams. In their upper reaches, these streams flow through timbered canyons with good year-round flows.

Segment B crosses two perennial drainages and the Columbia River between the northern end of Segment C and the Vantage Substation. The perennial drainages drain the northeastern corner of the Yakima Training Center (YTC). Extensive past grazing, military maneuvers, and other disturbances have caused changes in water flow and a general reduction in the quality of fish habitat within the two perennial drainages.

In Segment C, extensive past grazing, military maneuvers, and other disturbances have caused changes in flow **regimes** and a general reduction in the quality of fish habitat within the two perennial drainages crossed. In recent years, severe fires have damaged riparian vegetation and reduced the amount of vegetative cover on upland areas.

3.1.2.1 Water Quality

The Lower Yakima and Upper Columbia-Priest Rapids are identified as having serious water quality problems, such that aquatic conditions are well below state and tribal water quality goals (U.S. EPA 2000). The remaining three watersheds (Lower Crab, Upper Yakima, and Upper Columbia-Entiat) have less serious problems, although their aquatic conditions are also below state or tribal water quality goals (U.S. EPA 2000). Lower Crab Creek and the Columbia River are listed as **water quality limited** under Section 303(d) of the Federal Clean Water Act, due to extensive habitat modification. Corrective actions may currently be underway for these water bodies. It is possible that they are in compliance with state water quality

➔ For Your Information

Regime refers to the pattern and direction of the flow of the river.

Water quality limited under Section 303(d) of the Federal Clean Water Act refers to streams that do not meet current water quality standards.

standards, despite the fact that they are presently listed as water quality limited.

Table 3.1-2, *303(d) – Listed Water Bodies*, lists the parameters of concern for the 303(d)-listed water bodies in the study area. Data for this table was taken from the Washington State Department of Ecology's Final 1998 Section 303(d) List of Impaired and Threatened Waterbodies provided to the EPA.

Table 3.1-2
303(d) – Listed Water Bodies

	Water Quality Parameters						
	pH	Temperature	PCB	DDE	Dissolved Gas	Dissolved Oxygen	Fecal Coliform
Columbia River	■				■		
Crab Creek	■	■	■	■			
Mattawa Drain		■					

Source: Washington Department of Ecology 1998

→ For Your Information

A **PCB** is a family of industrial chemical compounds, noted as an environmental pollutant that accumulates in animal tissue.

A **DDE** is a product of the metabolic breakdown of DDT by an organism.

Shorelines are lakes, including reservoirs, of 20 acres or greater; streams with a mean annual flow of 20 cubic ft per second or greater; marine waters; plus an area landward 200 ft from the ordinary high water mark of the resource; and all associated marshes, bogs, swamps, and river deltas.

3.1.2.2 Shorelines

The Washington State Shoreline Management Act allows for cities or counties to guide the planning and management necessary to prevent the potential harmful effects of uncontrolled development along the shorelines of Washington State. It is based on the idea that the shorelines of the State are among the most valuable natural resources and unrestricted development is detrimental to the preservation of these resources.

The various line segments cross one river (Columbia), two creeks (Naneum and Lower Crab), and one lake (Nunnally) that have been designated as shorelines. Table 3.1-3, *Shorelines Crossed*, lists the shoreline, the line segment(s) that cross it and the jurisdiction.

Table 3.1-3
Shorelines Crossed

Shoreline	Line Segment	County
Naneum Creek	A	Kittitas
Columbia River	B	Kittitas, Grant
Nunnally Lake	E and F	Grant
Lower Crab Creek	D, E, and F	Grant

See Map 4, *Water Resources*, for locations of water bodies.

Naneum Creek is crossed by Segment A in Section 20 and 21 of T19N R19E in Kittitas County. The environmental designation of the

shoreline in this area is Rural, and is characterized primarily by agricultural activities with some compatible recreational uses.

In Kittitas County, Segment B crosses the west shore of the Columbia River in Section 20 of T16N R23E. The environmental designation of this area is Conservancy, which is characterized by uses primarily related to natural resource use. Recreational uses and low intensity recreational homes may be found within this designation. In Grant County, on the east side of the river (Section 21 of T16N R23E), the environmental designation of the shoreline is Rural.

Southeast of the Vantage Substation, Segments E (in Sections 25 and 36 of T16N R23E) and F (in Section 35 of T16N R23E) cross Nunnally Lake. This lake has a shoreline designation of Conservancy due to the lack of development around the lake.

Just south of Nunnally Lake is Lower Crab Creek. This east-west oriented creek is crossed by all three alternatives in Grant County, Segments D (in Section 2 of T15N R23E), E (in Section 2 of T15N R23E), and F (in Section 36 of T16N R23E). The environmental designation of the shoreline at all three of these crossings is Conservancy due to the lack of development around these areas of the creek.

Segment D, Segment E, and Segment F cross the Columbia River in the Hanford Reach National Monument (Segment D in Section 11 T13N R24E and Segment E and F in Sections 28 and 29, T14N, R26E). The Grant County and Benton County Shoreline Master Programs do not apply to the Columbia River in this area due to it being federal land. Therefore, the Columbia River is not considered a shoreline of statewide significance at these crossings.

3.1.2.3 Aquifers

Aquifers between Miocene basaltic rocks are prominent in the Columbia Plateau basaltic aquifer system. These aquifers consist of numerous flows of basaltic lava. Permeable zones between the lava flows form these aquifer layers. Groundwater quality in the proposed study area is variable, depending on the layer of basalt from which the groundwater is taken. Groundwater quality issues are mostly due to elevated concentrations of nutrients, trace organic compounds, and sodium and nitrates (USGS 1991 & Kevin Lindsay, May 23, 2001). Nitrates found in the groundwater are mostly associated with irrigated farming areas. The Columbia Plateau basaltic aquifer system is a major source of water for municipal, agricultural, and domestic uses (USGS 1991).

For Your Information

An **aquifer** is a layer of underground sand, gravel, or spongy rock in which water collects.

3.2 Floodplains and Wetlands

3.2.1 Floodplains

The Federal Emergency Management Agency (FEMA) identifies areas that have a one-percent chance of being flooded in a given year as 100-year floodplains. Areas identified as 100-year floodplains are shown on Flood Insurance Rate Maps. Areas where line segments would cross floodplains shown on FEMA maps are listed in Table 3.2-1, *Potential Crossings of 100-Year Floodplains*, and shown on Map 4, *Water Resources*.

Table 3.2-1
Potential Crossings of 100-Year Floodplains

Name of Water Feature	Line Segments					
	A	B	C	D	E	F
Wilson Spur/Naneum Creek crossings	■					
Cooke Canyon Creek	■					
Columbia River crossings		■		■	■	■
Lower Crab Creek (P)				■	■	■
Nunnally Lake					■	
Dry Creek			■	■		

The main water feature in the study area is the Columbia River. The 100-year floodplain is relatively narrow along the Columbia River because dams in the study area regulate flows. The largest flood in recent times occurred in 1948; it is very unlikely that large scale flooding would recur because of the construction of several flood-control/water-storage dams upstream of the study area since 1948.

Several FEMA floodplain areas are located in Segment A. In the Sickler-Schultz relocation area, Naneum and Wilson Creeks meander near each other eventually joining just south of the existing Schultz-Vantage line (see Figure 2.1, *Schultz Substation Area Redesign*). Near their intersection the two creeks essentially share one floodplain area, which is broad tree and shrub lined containing the braided channels of both creeks. At the northern crossing of Naneum Creek, the floodplain is located within a narrow canyon. The Cooke Canyon Creek floodplain crossing consists of several narrow, rocky creek channels in a fairly level area.

Segment B would cross the Columbia River south of Wanapum Dam and north of Priest Rapids Dam. See Map 4, *Water Resources*. In this portion of the river, the river is impounded and flows are regulated by discharges at Wanapum Dam. The structures on existing BPA transmission lines near the area where Segment B would cross are all outside the 100-year floodplain.

At the southern end of Segments C and D, the Dry Creek floodplain is located immediately to the south of the proposed Wautoma substation. The substation would be located outside of the area mapped as the 100-year floodplain along Dry Creek although one existing BPA structure is located within the floodplain.

Segments D, E, and F would cross the Columbia River downstream from Priest Rapids Dam. This portion of the Columbia River is the only unimpounded stretch of the Columbia River in the United States. Known as the Hanford Reach, flows fluctuate considerably but they are controlled by releases from Priest Rapids Dam. Existing BPA transmission lines span the Columbia River near each of the proposed crossings and all existing BPA structures are located outside the 100-year floodplain.

Two additional floodplains within the study area are identified on FEMA floodplain maps: Nunnally Lake, located north of Lower Crab Creek along Segment F; and the main channel of Lower Crab Creek crossed by Segments D, E, and F.

3.2.2 Wetlands

Many of the wetlands in the study area have been altered or disturbed by human activities. Examples of activities that have disturbed wetlands in the study area include road crossings, agricultural uses, and grazing. Once wetlands have been disturbed, they are susceptible to invasion by non-native species, such as Russian olive, saltcedar, exotic reed species and purple loosestrife. Often times, once a wetland has been invaded by non-native species, a **monoculture** is formed that out-competes native wetland species and reduces the habitat function.

The presence of wetlands in the study area was initially investigated using National Wetlands Inventory (NWI) maps. NWI maps depict natural and human-made wetlands and water habitats. Aerial photographs were overlaid on a map of NWI wetlands for each segment to determine if known wetlands were present. Wetlands within approximately 500 feet of either side of the proposed line were considered within the wetland study area. Portions of the study area were visited or viewed during two brief field surveys. Information on wetlands found along each segment is summarized below and shown on Map 5, *Wetlands/Plant Associations*. Further characterization of these areas would occur prior to construction of the chosen alternative to verify that they meet soils, vegetation, and hydrology criteria for wetlands.

➔ For Your Information

*A **monoculture** is the growth of a single species, tending to exclude other species, resulting in a decrease in biodiversity.*

→ For Your Information

The NWI maps include intermittent streams that are not considered true wetlands. Each Segment crosses some of these intermittent streams:

Segment A	22 Crossings
Segment B_{north}	3 Crossings
Segment B_{south}	3 Crossings
Segment C	11 Crossings
Segment D	7 Crossings
Segment E	9 Crossings
Segment F	12 Crossings

Emergent wetlands are wetlands dominated by herbaceous plants.

Forested wetlands are wetlands with a tree canopy.

Scrub-shrub wetlands are wetlands dominated by shrubby plants and low-growing woody species with multiple stems.

3.2.2.1 Segment A

The 17 NWI mapped wetlands in Segment A are associated with either intermittent or perennial creeks (See Table 3.2-2, *Wetlands Located Along Segment A*). With the exception of Wilson, Naneum, and Cooke Canyon Creeks, all are located along narrow drainages, with a narrow band of vegetation.

Naneum and Wilson creeks would both be crossed twice. In the crossing to the north, the two creeks are separated by approximately 0.5 mi. Naneum Creek has a narrow band of **emergent wetlands** associated with it in the area of the proposed crossing, and Wilson Creek has several braided channels in the area of the proposed line. One creek channel of Wilson Creek has a narrow channel of **forested wetland**. The NWI depicts the other channels of Wilson Creek as emergent wetlands.

Naneum and Wilson creeks flow very close to each other in the crossing to the south. This area is depicted as a **scrub-shrub wetland** area and it is vegetated with scattered shrubs, wavy-leaved alder, bittercherry, and occasional black cottonwoods.

Cooke Canyon Creek runs through a fairly level area and it consists of several narrow, rocky creek channels. The dominant woody species along Cooke Canyon Creek are black cottonwood, black hawthorn, and willows.

Table 3.2-2
Wetlands Located Along Segment A

Water Feature Name, if known	Perennial or Intermittent	Location	NWI Classification
Naneum Creek (north crossing)	P	T19N -R19E-20	riverine, palustrine, emergent, seasonally to permanently flooded
Wilson Creek (north crossing)	P	T19N -R19E-20	palustrine, emergent, seasonally flooded
Naneum/Wilson Creek crossing	P	T19N -R19E-20	palustrine, scrub-shrub, seasonally flooded, or riverine, open water, permanently flooded
Creek	I	T19N -R19E-21	
Cave Canyon Creek	P	T19N -R19E-28	palustrine, scrub-shrub wetland, seasonally flooded
Creek	I	T19N -R19E-27	riverine, seasonally flooded
Charlton Canyon Creek	I	T19N -R19E-27	riverine, seasonally flooded
Tributary of creek in Charlton Canyon	P	T19N -R19E-27	riverine, temporarily flooded
Creek in Schnebly Canyon	P	T19N -R19E-26	palustrine, scrub-shrub wetland, seasonally flooded
Coleman Creek	P	T19N -R19E-36	3 channels designated as riverine, open water, permanently flooded
Cooke Canyon Creek	P	T18N -R20E-6	palustrine, forested wetland, seasonally flooded
Trail Creek	P	T18N -R20E-5	riverine, seasonally flooded
Caribou Creek	P	T18N -R20E-8	palustrine, emergent wetland, seasonally to permanently flooded
Tributary of Caribou Creek	I	T18N -R20E-16	About 0.5 mile to the north: riverine, seasonally flooded About 0.5 mile to the south palustrine, scrub-shrub wetland, seasonally flooded
Parke Creek	I	T18N -R20E-27	riverine, seasonally flooded
Creek	I	T17N -R21E-20	palustrine, emergent wetland, with persistent vegetation, temporarily flooded

3.2.2.2 Segment B

Option B_{NORTH} – Two narrow wetlands along Option B_{NORTH} are associated with two unnamed creeks (See Table 3.2-3, *Wetlands Located Along Option B_{NORTH}*). One is classified an emergent wetland and the other as a riverine system. The Columbia River is noted on the NWI maps as a lake, but does not have wetlands on either side of it; rather a sparse upland plant community dominated by rabbitbrush and **forbs** grows almost to the edge of the water with occasional willows next to the water.

➡ For Your Information

Forbs are herbaceous species other than grass.

Table 3.2-3
Wetlands Located Along Option B_{NORTH}

Name of Water Feature, if known	Perennial or Intermittent	Location	NWI Classification
Unnamed Creek	P	T16N-R22E-15	palustrine, emergent wetland, persistent vegetation, temporarily flooded
Unnamed Creek	I	T16N-R22E-23	riverine, seasonally flooded
Columbia River	P	T16N-R23E-20	lake, limnetic, open water, permanently flooded, and diked/impounded

Option B_{SOUTH} – According to the NWI, three narrow riverine wetlands are associated with tributaries of Johnson Creek along Option B_{SOUTH} (See Table 3.2-4, *Wetlands Located Along Option B_{SOUTH}*). The Columbia River crossing is described in Option B_{north} above.

Table 3.2-4
Wetlands Located Along Option B_{SOUTH}

Name of Water Feature	Perennial or Intermittent	Location	NWI Classification
Tributary of Johnson Creek	I	T16N-R22E-21	riverine seasonally flooded
Tributary of Johnson Creek	I	T16N-R22E-22	riverine, seasonally flooded
Tributary of Johnson Creek	I	T16N-R22E-23	riverine, seasonally flooded
Columbia River	P	T16N-R23E-20	lake, limnetic, open water, permanently flooded, and diked/impounded

3.2.2.3 Segment C

Along Segment C there are 11 creeks that have wetlands associated with them (See Table 3.2-5, *Wetlands Located Along Segment C*). The NWI indicates that these creeks have a narrow band of wetland vegetation, with an abrupt transition to upland communities.

There are no forested wetlands along Segment C. One scrub-shrub wetland occurs in Corral Canyon on the YTC. The YTC Management Plan describes scrub-shrub wetlands on YTC as generally dominated by willows, which may be associated with other shrub species including chokecherry, mock orange, Wood's rose, and red-osier dogwood (USDOA, 1996).

Four emergent wetlands are mapped in the YTC portion of Segment C. Emergent wetlands on YTC are typically dominated by

rushes, cattails, sedges, saltgrass, rabbitsfoot grass, mint, stinging nettle, and teasel (USDOA, 1996).

The remaining wetlands in Segment C include seven riverine wetlands, all characterized as intermittent, with a definite streambed. These areas may be riparian in nature. It is not known if any seeps or springs occur in the area of Segment C.

YTC has analyzed the condition of riparian areas and examined human activities that have had detrimental effects on water resources (USDOA, 1996). Past grazing has had the greatest effect on riparian/wetland systems in the Cold Creek, Hanson, Johnson, and Middle Canyon drainages. Fire has had the greatest effect within the Corral Canyon drainage. The Alkali Canyon drainage has been affected by both fire and grazing. YTC reports that riparian conditions have improved over the past five years in the Alkali Canyon and Corral Canyon areas, while it has declined in all other watersheds in the study area. YTC has initiated riparian restoration projects that have improved riparian conditions in the study area.

Table 3.2-5
Wetlands Located Along Segment C

Name of Water Feature, if known	Perennial or Intermittent	Location	NWI Classification
Johnson Creek	P	T16N-R22E-20	palustrine, emergent wetland, with persistent vegetation, seasonally flooded
Hanson Creek	P	T15N-R22E-8	palustrine, emergent wetland, with persistent vegetation, seasonally flooded
Cottonwood Creek	I	T15N-R22E-21	riverine, seasonally flooded, mapped to the east of the proposed line; palustrine, emergent wetland, with persistent vegetation, seasonally flooded, mapped to the west
Unnamed creek	I	T15N-R22E-28	riverine, seasonally flooded (includes two forks of the creek)
Creek in Alkali Canyon	P	T14N-R22E-3	palustrine, emergent wetland, with persistent vegetation, seasonally flooded
Creek in Corral Canyon	P	T14N-R22E-15	palustrine, scrub-shrub wetland, with broadleaf deciduous vegetation, temporarily flooded
Tributary to creek in Corral Canyon	I	T14N-R22E-14	palustrine, emergent wetland, with persistent vegetation, seasonally flooded
Tributary to creek in Corral Canyon	I	T14N-R22E-23	riverine, seasonally flooded
Creek in Sourdough Canyon	I	T14N-R22E-25	riverine, seasonally flooded
Cold Creek	I or P	T13N-R23E-20	riverine, seasonally flooded
Tributary to Cold Creek	I or P	T13N-R23E-35	riverine, seasonally flooded
Dry Creek	I	T12N-R24E-20	riverine, seasonally flooded

3.2.2.4 Segment D

The NWI maps depict six wetlands crossed by Segment D (See Table 3.2-6, *Wetlands Located Along Segment D*). One is a wide band of emergent wetlands on the north side of Lower Crab Creek. To the south of Lower Crab Creek, a wetland designated as open water, excavated area, is fed by irrigation outflow. The plant community in this area is mostly weedy species, with some natives (Beck, 2001).

Segment D spans the Columbia River. The NWI classifies it as lacustrine open water with no wetlands associated with it on either side.

On the summit of Umtanum Ridge, just south of the Midway area, an alkaline spring has been documented at the east end of the ridge (Soll, 1999). It is not known if this spring is in the area of the proposed line. Springs may be associated with wetland areas, even in high elevation, rocky areas.

South of the Columbia River, two narrow wetlands are associated with creeks. Both of these areas are riverine systems, with a definite streambed and intermittent flow.

Segment D would end at the site of the proposed Wautoma Substation. The proposed substation site does not have wetlands as described under Segment C above.

Table 3.2-6
Wetlands Located Along Segment D

Name of Water Feature, if known	Perennial or Intermittent	Location	NWI Classification
Lower Crab Creek	P	T15N -R23E-2	palustrine emergent wetland, persistent vegetation, seasonally to permanently flooded
Wetland	--	T14N -R24E-5	palustrine, open water, semi-permanently flooded, excavated
Columbia River	P	T13N -R24E-11	lacustrine, open water, permanently flooded; no adjacent wetlands on shore
Cold Creek	I	T13N -R24E-34	riverine, seasonally flooded
Unnamed Creek	I	T13N -R24E-34	riverine, seasonally flooded
Dry Creek	I	T12N -R24E-Sec 20	riverine, seasonally flooded

3.2.2.5 Segment E

Ten wetlands are indicated on the NWI that are crossed by Segment E (See Table 3.2-7, *Wetlands Located Along Segment E*).

To the north of Lower Crab Creek, a large wetland area is fed by an outflow channel from Nunnally Lake. In this wetland **complex**, emergent wetlands are located in the area of the proposed line. Two emergent wetlands that are not connected to a watercourse are also located to the north of Lower Crab Creek. Along Lower Crab Creek, the NWI map depicts a wide band of emergent wetlands on the north side of the creek channel.

➔ For Your Information

A **complex** is a specific watershed area within the YTC. The YTC is divided into ten complexes.

Within agricultural areas, four irrigation ditches have a riverine designation. Some appear to be historic creek channels, based on some natural looking meanders, while other areas appear to be straightened and may function as irrigation ditches.

A large wetland area known as the Saddle Mountain Wasteway is located immediately to the north of the Columbia River. A berm separates the river from this wetland so there is no surface water connection. The water feeding this wetland originates in irrigation ditches to the northeast. The irrigation outflow enters Saddle Mountain Lake, then leaves the lake through a stream channel, which then flows into the Saddle Mountain Wasteway. The NWI labels different portions of this wetland with different designations to indicate that it is composed of several different wetland types. Some of the wetland has been excavated; while other areas are labeled as either riverine or emergent wetlands.

The Columbia River is defined as an open water lake where Segment E crosses, but there are no adjacent wetland areas at the edge of the river.

Table 3.2-7
Wetlands Located Along Segment E

Name of Water Feature	Perennial or Intermittent	Location	NWI Classification
Wetland	--	T16N-R23E-35	palustrine, emergent, persistent vegetation, seasonally flooded
Wetland	--	T16N-R23E-Sec 35	palustrine, emergent, persistent vegetation, seasonally flooded
Wetland fed by outflow channel from Nunnally Lake	--	T16N-R23E-Sec 35	lacustrine, littoral, unconsolidated bottom, permanently flooded and diked/impounded
Lower Crab Creek	P	T15N-R23E-2	palustrine, emergent wetland, with persistent vegetation, seasonally to permanently flooded
Irrigation ditch	I	T15N-R24E-25	riverine, artificially flooded, seasonally flooded, excavated
Irrigation ditch	I	T15N-R25E-31	riverine, excavated
Irrigation Ditch	P	T15N-R25E-11	palustrine, open water, semi-permanently flooded, excavated
Irrigation Ditch	I	T14N-R26E-11	riverine, artificially flooded, seasonally flooded, excavated
Saddle Mountain Wasteway	--	T14N-R26E-20	riverine, semipermanently flooded
	--	T14N-R26E-20 & 29	palustrine, emergent, with persistent vegetation, seasonally flooded
Columbia River	P	T14N-R26E-29 & 28	lake, limnetic, open water, artificially and permanently flooded

3.2.2.6 Segment F

Segment F has nine wetland areas mapped by the NWI (See Table 3.2-8, *Wetlands Located Along Segment F*).

North of Lower Crab Creek, Nunnally Lake is mapped as an open water, lacustrine wetland. The NWI does not map adjacent wetland areas along the margins of the lake, as verified in the field through an aerial survey. A narrow band of shrubs and trees, probably black cottonwoods and willows, lines the edge of the lake and the plant community abruptly transitions to upland shrub-steppe.

Two emergent wetlands, located to the north of Lower Crab Creek, appear to be isolated wetlands that are not connected to a watercourse. Along Lower Crab Creek, the NWI depicts a wide band of emergent wetland north of the creek channel.

The estimated 12 intermittent creeks that drain down the south slope of the Saddle Mountains do not have adjacent wetland according to the NWI. At the base of the Saddle Mountains, an irrigation ditch is mapped on the NWI.

Two wetland areas occur on the Saddle Mountains Unit of the Hanford Reach National Monument. One is a narrow emergent wetland that was observed in the field and is not mapped on the NWI (St. Hilaire, 2001). The large wetland area to the north of Columbia River (Saddle Mountain Wasteway) and the Columbia River crossing are described under Segment E (See Section 3.2.2.5, *Segment E*).

Table 3.2-8
Wetlands Located Along Segment F

Name of Water Feature	Perennial or Intermittent	Location	NWI Classification
Nunnally Lake	P	T16N -R23E -25 & 36	lacustrine, limnetic, open water/unknown bottom, permanently flooded
Wetland	--	T16N -R23E -36	palustrine scrub-shrub wetland/emergent wetland with persistent vegetation, seasonally flooded
Wetland	--	T16N -R23E -36	palustrine, emergent wetland with persistent vegetation, seasonally flooded
Adjacent wetland north of Lower Crab Creek	--	T16N -R23E -36	palustrine, emergent wetland with persistent vegetation, seasonally flooded
Lower Crab Creek	P	T16N -R23E -36	riverine, lower perennial, open water, permanently flooded
Irrigation Ditch	P	T15N -R26E -21 & 28	palustrine, open water, semi-permanently flooded, excavated
Wetland	--	T14N -R26E -16 & 21	palustrine, emergent wetland
Saddle Mountain Wasteway	--	T14N -R26E -20	riverine, semipermanently flooded
	--	T14N -R26E -20 & 29	palustrine, emergent, with persistent vegetation, seasonally flooded
Columbia River	P	T14N -R26E -29 & 28	lake, limnetic, open water, artificially and permanently flooded

3.3 Soils and Geology

Diverse landforms and geologic features exist within the proposed study area, which is in the Columbia Plateau **physiographic** province. The landscape within the plateau consists mostly of large and small hills with flat tops, extensive plateaus, **incised** rivers, and **anticline** ridges. The **Miocene Columbia River Basalt Group** underlies the region and is interbedded by **Neogene** terrestrial sediments (DNR 1991).

The seismicity of the Columbia Plateau is relatively low compared to other regions in the Pacific Northwest. In 1936, the town of Milton-Freewater experienced an earthquake with a Richter scale magnitude of 5.75. This is the largest recorded earthquake known to have occurred in the Columbia Plateau (USDOE 1999). Closer to the Hanford Site near the central part of the Columbia Plateau, an earthquake with a 4.4 Richter scale magnitude occurred in 1918 and again in 1973. These earthquakes were located near Othello, north of the Hanford Site, and are the largest recorded earthquakes that have occurred near the Hanford Site (USDOE 1999).

Geologic hazards in the proposed study area include steep slopes and erosion. Soil blowing and water erosion are the most active erosion processes due to the area's high relief, steepness of slope, and restricted available water capacity for the production of **forage** (USDA 1984).

From the Schultz Substation at an elevation of 2,300 feet, Segments A, B_{NORTH}, and B_{SOUTH} would cross a broad plateau that extends to the Saddle Mountains in the northern portion of the YTC. Soils from the Schultz Substation to the Vantage Substation vary from shallow to deep, are well drained, and formed in a variety of parent materials including **loess**, **residuum**, **alluvium**, and basaltic **colluviums** (Remote Sensing 1998).

From the northern portion of the YTC, the landscape is characterized by ridges and valleys (the Saddle Mountains, Umtanum Ridge, and the Yakima Ridge) that were from the underlying basalt layers being folded and faulted. These ridges and valleys were further modified by glaciers and flooding (USDOD Army 1996). Alluvial and wind-blown deposits of loess blanket the majority of the YTC.

From the Vantage Substation (elevation 900 feet) in Grant County, the area is generally smooth and southward sloping. The southward-sloping plain is deeply dissected and interrupted by the Saddle Mountains (approximate elevation 2,300 feet), and Crab Creek runs along its base (USDA 1984). The Saddle Mountains are primarily made of basalt that has buckled into anticlines that trend in an east to

➔ For Your Information

Physiography is the study of the structure and phenomena of the earth's surface.

Rivers that have craved a path through the bedrock of an area are **incised**.

Anticline is an arching fold in layered rocks.

Miocene is the period in the Neogene lasting from 23 million years ago to 5 million years ago.

The **Columbia River Basalt Group**, composed of the Grand Ronde Basalt and the overlying Wanapuma and Saddle Mountains Basalt, comprises most of the aquifer system (USGS 1994).

Neogene is the geological period lasting from 23 million years ago to present day.

Forage is food for domestic animals, i.e. cattle, sheep, etc.

Loess is a windblown deposit of fine-grained silt or clay.

Residuum is unconsolidated weathered mineral material that accumulated as consolidated rock and disintegrated in place.

Alluvium is sedimentary material deposited by flowing water as in a delta or riverbed.

Colluvium is soil and/or rock fragments moved by creep, slide, local wash and deposited at the base of steep slopes.

west direction (Alt 1994). These mountains had considerable faulting in their geologic past. The slopes to the south of the mountains are gentle in comparison to the bold relief of the north-facing cliffs.

Soils in the Saddle Mountains range from deep and well drained to very shallow with rock outcrops. Deep soils are found mostly on the upland flat benches or on areas with rolling topography. Shallow soils are predominantly found on steep north- and south-facing slopes and ridge tops. The east-facing slopes tend to have deeper soils than the west-facing slopes, due to prevailing winds that deposit sand and silt on the leeward side of the hills (BLM 1997).

From the top of the Saddle Mountains the Wahluke Slope trends southward to the Columbia River and the Hanford Site. This slope is relatively flat-bottomed. The Wahluke Slope's soils are deep, well drained, and nearly level. The soils were formed from a variety of parent materials including gravelly glacial outwash, sand derived from mixed sources, and ***lacustrine deposits*** (USDA 1984).

Low-relief plains and the Yakima Ridge dominate the Hanford Site. Several enormous floods modified the topography of the Hanford Site, when ice dams in western Montana and northern Idaho breached, emptied their entire contents, and spread across eastern Washington. This flooding, which is known as the Missoula Floods, occurred between 12,700 and 15,300 years ago (WSDNR website) and left sediments and a mix of topography that is now known as the Channeled Scablands (USDOE 1999).

→ For Your Information

Lacustrine deposits are material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

3.4 Vegetation

The diversity of plant species and quality of the vegetation in the study area can be assessed by determining the **plant community**, found in different locations. A table in Appendix E, *Vegetation*, lists the scientific name for each plant species discussed below.

The vegetation type found in most of the study area is referred to as shrub-steppe, with some grasslands (Franklin, 1973). With the exception of some riparian areas, few trees are able to survive in this arid landscape. The dominant woody vegetation on most upland sites consists of shrub species, predominantly sagebrush species. The understory of herbaceous plants in shrub-steppe was dominated by native perennial bunchgrasses prior to European settlement. Within the project area, native bunchgrass dominated communities are no longer common due to invasion by annual grasses and weedy species after various types of disturbance (Quigley, 1999).

Shrub-steppe vegetation in the study area is characterized as a potential big sagebrush/bluebunch wheatgrass zone (Daubenmire, 1970). This is the community that is expected to occur without disturbance, alteration of habitat, or invasion by non-native species.

The dominant shrubs currently existing in upland areas commonly include several species of sagebrush, including big sagebrush, threetip sagebrush, stiff sagebrush, low sagebrush, bitterbrush, and rabbitbrush. In most areas today, non-native species, including cheatgrass, are now dominant.

In the study area, very few riparian areas have a tree overstory, and shrub-lined riparian areas are more common. Drier riparian areas are typically vegetated with upland shrubs, including sagebrush. Russian olive (an invasive species) is the most common tree species in riparian areas and wet areas.

The agricultural lands in the valley are mainly in cropland with small adjacent areas that may have some remnants of native plant communities.

3.4.1 WNHP High Quality Plant Communities

The Washington Natural Heritage Program (WNHP) tracks the occurrence of “high quality plant communities” within “**high quality terrestrial ecosystems**” (WNHP Website). Two WNHP high quality plant communities occur along line segments (Map 5, *Wetlands/Plant Associations*). The Wyoming big sagebrush/bluebunch wheatgrass shrubland community occurs in one small location along Segment A.

➔ For Your Information

The study area for vegetation includes an area approximately 0.25 mile on either side of each of the proposed segments, for a total of a 0.5-mile-wide strip centered on the proposed segment. Factors that influence the distribution of plant communities include aspect, slope, elevation, moisture source, and duration, and the type of soils, including rock content, and soil depth. The common names of plant species, rather than scientific names, are used in the discussion of vegetation that follows.

Plant communities (also known as plant associations) are assemblages of species that grow together in similar habitats and are found repeated across the landscape.

*To be considered a **high quality terrestrial ecosystem**, an area must be dominated by native species, with little to no disturbance to vegetation, and have high ecological value, both in condition and viability, and the ability to persist on a site over time.*

The bitterbrush/Indian ricegrass shrubland community occurs in a broad band north of the Columbia River along segments D, E, and F.

3.4.2 Vegetation Cover Types

The USGS produces National Land Cover Data Maps that include some information on vegetation. These maps were used to calculate vegetation cover types along various project segments, presented in Table 3.4-1, *Vegetation Cover Types by Segment*, and Table 3.4-2, *Vegetation Cover Types by Alternative*. This data provides a measure of the amount of existing native vegetation along each segment. The two categories, Grasslands or Herbaceous and Shrubland, represent areas with plant communities that are likely to have some native species remaining although the condition of these areas could vary from fairly pristine to very degraded. Areas where agricultural activities occur are unlikely to recover and return to natural vegetation, even if abandoned (although efforts are made to convert back to native species while irrigation systems are in place can be successful). The information on tree cover illustrates how few trees exist in the study area and the importance of tree-lined riparian areas.

Table 3.4-1
Vegetation Cover Types by Segment

Vegetation Cover	Cover Along Each Segment (miles)						
	A	B _{NORTH}	B _{SOUTH}	C	D	E	F
Trees	0.68	0.00	0.00	0.19	0.18	0.05	0.00
Shrubland	26.22	6.17	6.69	22.07	10.09	12.82	23.01
Grasslands or Herbaceous	1.73	2.87	2.91	7.46	7.23	3.91	7.76
Agricultural	0.53	0.00	0.00	0.00	8.85	5.87	0.39

Source: USGS National Land Cover Data Maps, 2000

Table 3.4-2
Vegetation Cover Types by Alternative

Vegetation Cover	Cover Along Each Alternative (miles)					
	1 A, B _N , E	1 A, B _S , E	1A A, B _N , F	1A A, B _S , F	2 A, B _S , D	3 A, C
Trees	0.73	0.73	0.68	0.68	0.86	0.87
Shrubland	45.21	45.73	55.40	55.92	43.00	48.29
Grasslands or Herbaceous	8.51	8.55	12.36	12.40	11.87	9.19
Agricultural	6.40	6.40	0.92	0.92	9.38	0.53

Source: USGS National Land Cover Data Maps, 2000

➔ For Your Information

Lithosols are rocky soils that usually develop in areas underlain by basalt.

3.4.2.1 Segment A

The vegetation of Segment A is mainly shrubland, with very little grassland and agricultural lands. Portions of Segment A support an attractive shrub-steppe plant community known as a ***lithosol***

community (St. Hilaire, 2001). Because big sagebrush and many grass species cannot survive in rocky soils over basalt, the lithosol zone is known for having spectacular spring wildflower displays (Taylor, 1992). Portions of Segment A have areas of lithosols that support stiff sagebrush, Sandberg's bluegrass, and a variety of wildflowers species. Flowering plant species observed growing along Segment A include desert buckwheat, dwarf goldenweed, cushion phlox, biscuitroot, and yarrow (St. Hilaire, 2001).

Other portions of Segment A have adequate soils to support the big sagebrush/bluebunch wheatgrass community that is the dominant potential plant community throughout the study area. Because of past disturbance, native grasses have declined and the dominant grass species is generally cheatgrass. Diffuse knapweed, a weedy species, is common along roadsides within Segment A, as it is throughout the study area.

One area of Segment A covered by the big sagebrush/bluebunch wheatgrass community is sufficiently pristine to qualify as a WNHP high quality plant association, as discussed above. This is the only occurrence of this high quality plant association in the study area. It occurs along approximately 0.2 mile of Segment A. Other species found in this community include occasional stiff sagebrush, bitterbrush, and gray rabbitbrush.

Segment A has two tree-lined riparian areas. Naneum Creek, in the northern portion of Segment A, is lined by scattered black cottonwoods, bittercherry, wavy-leaved alder, and aspen with a shrub understory of willows, rose, and red osier dogwood. To the southeast, Cooke Canyon Creek has a black cottonwood-lined riparian area with areas of black hawthorn and scattered shrubs, including willows in wetter areas and ocean-spray in dry areas. Several intermittent creeks along Segment A support channel vegetation consisting mainly of upland shrubs, including ocean-spray, rose, hawthorn, and sagebrush, with an understory of cheatgrass, yarrow, chicory, and other species.

As a part of a potential reroute of the new line and the existing Schultz-Vantage line, the existing Schultz-Vantage line would be rerouted 1.30 miles, approximately 0.29 mile longer than it is now. The new line would parallel the Schultz-Vantage for a distance of 1.27 miles, approximately 0.23 mile longer than Segment A was originally planned. The reroute in Segment A would reduce impacts to forested lands and grasslands and increase the impacts to shrublands compared to Segment A. The existing Schultz-Vantage reroute would cause similar changes in impacts. Removal of the existing Schultz-Vantage line would cause additional impacts to

vegetation along 1.01 miles from equipment passage and tower removal.

3.4.2.2 Segment B (Options B_{NORTH} and B_{SOUTH})

The vegetation of B_{NORTH} and B_{SOUTH} is mainly shrubland with some grasslands and has no agricultural land. Most of Options B_{NORTH} and B_{SOUTH} are covered with shrub-steppe vegetation dominated by sagebrush.

The area immediately to the west of the Columbia River is gravelly with very little vegetative cover, including a few willows scattered at the water's edge. The slope from the river leading up to the highway is vegetated with rabbitbrush, occasional sagebrush, and various grass species. Shrub-steppe tops the bare rocky cliff above the highway, extending to the west. On the east side of the Columbia River, a dry, level, sagebrush-dominated area extends along the river. Cheatgrass and knapweed are common in the understory with some native vegetation, including yarrow and buckwheat. Between the Columbia River and the Vantage Substation, the proposed line traverses a hilly, dry expanse of shrub-steppe.

3.4.2.3 Segment C

The vegetation of Segment C is mainly shrubland with some grasslands and no agricultural land. YTC categorizes their habitats as upland, riparian, alkali, or rocky habitats (USDOE, 1996). Five potential plant communities occur within these habitat types in all of the watersheds traversed by Segment C. Plant communities on YTC are generally not pristine and cheatgrass commonly replaces bluebunch wheatgrass in many areas due to past grazing.

The five plant communities within the YTC portion of Segment C include:

- **Big sagebrush/bluebunch wheatgrass:** This community is estimated to cover half of the uplands at YTC. It is found on ridgetops, hillsides, benches, and alluvial fans on shallow and deep soils. Associated species include gray and green rabbitbrush, desert buckwheat, three-tip sagebrush, and spiny hopsage associated with various grass species. Bitterbrush is co-dominant with big sagebrush in moist sites.
- **Three-tip sagebrush/bluebunch wheatgrass:** This community is typically found on northern exposed hillslopes, canyon walls, and ridgetops, with moderately deep to deep soils. Associated species include big sagebrush, desert buckwheat, with traces of spiny hopsage, purple sage, and various grass species.

- **Stiff sagebrush/bluegrass:** This low-growing community occurs on hillsides, ridgetops, and benches in shallow soils. The climax shrub canopy is dominated by stiff sagebrush and eriogonum with traces of Wyoming big sagebrush, slenderbush eriogonum, purple sage, and bitterbrush, with a grass understory.
- **Eriogonum/ bluegrass:** This low-growing community is found on hillsides, ridgetops, and on shallow soils. The climax shrub canopy is dominated by eriogonum and either stiff sagebrush or three-tip sagebrush with a trace of Wyoming big sagebrush and purple sage. The herbaceous understory is mainly composed of grasses.
- **Alkali habitat:** This habitat type, found only in the Hanson Creek watershed, is normally found in bottomlands adjacent to intermittent streams and is occasionally associated with riparian communities bordering perennial streams. This community consists of black greasewood with traces of gray rabbitbrush.

Within the YTC, the level and type of disturbance to vegetation varies depending on the location. Most portions of the study area were grazed until 1995. Grazing reduced cover by perennial grasses and native forbs, and increased the cover by sagebrush. Grazing also damaged the vegetation in riparian areas although YTC has implemented riparian restoration projects along some creeks in the study area. Roads are present within most portions of the watershed, serving to disperse weed species. Training maneuvers occur in portions of the study area, damaging vegetation. Some of the vegetation in the study area is still in the recovery process after several fires in the 1970's and 1980's damaged vegetation. Native species were replaced with non-native species and habitat conditions were altered due to erosion.

Although the proposed Wautoma substation site was once a shrub-steppe community, the site is currently dominated by herbaceous species with only occasional sagebrush and rabbitbrush (St. Hilaire, 2001). This area burned sometime in the past, as evidenced by charred shrub stumps and abundant soot in the soil. Two non-native weedy species, tumble mustard and cheatgrass, are the dominant species on the site, but other common weeds include diffuse knapweed, spotted knapweed, and kochia. Native forbs scattered on the site include chaenactis, green-banded star-tulip, curve-pod milk-vetch, Grays' desert parsley, scarlet globemallow, cushion daisy, phlox, and balsamroot, all relatively common shrub-steppe species.

3.4.2.4 Segment D

The vegetation of Segment D is mainly shrubland with some grasslands, and the most agricultural lands of any the segments. The riparian area along the north shore of Lower Crab Creek is described as willow-dominated wetland (WDFW, April 2, 2001). Along the southern shore of Lower Crab Creek, emergent wetlands are vegetated with rushes, cat-tails, grasses, and forbs. Some Russian olive, a non-native tree, occurs in the area. To the south, the rocky, steep slopes on the north side of Saddle Mountains are described as having sparse shrub-steppe vegetation in some areas with a gentler slope. In the valley to the south, the agricultural lands are intensively farmed with small adjacent areas that may have some remnants of native plant communities, but are more likely vegetated with non-native species.

To the north of the Columbia River, a WNHP high quality native plant association occurs along approximately 0.8 mile of Segment D. This community, the bitterbrush/Indian ricegrass community, occurs in dune areas where the sand tends to shift in the winds. This creates an unstable environment in which only certain species can survive, such as Indian rice grass, white-stemmed evening primrose, sand dock, and some short-lived annuals. In one portion of this community, big sagebrush is associated with bitterbrush and Indian ricegrass (USDOE, 2001). Wetland plant communities do not appear to occur along the Columbia River north of the Midway Substation, except possibly for a narrow herbaceous shoreline community.

The Midway Substation is a very dry site at the base of Umtanum Ridge. The area within and immediately adjacent to the substation has been cleared of natural vegetation, with sparse shrub-steppe extending to the base of Umtanum Ridge. Several plant communities are mapped on Umtanum Ridge and to the south (USDOE, 2001). Rocky areas include the rocky cliffs of Umtanum ridge and a narrow strip of talus (rock strewn area) on the top of the ridge. Rocky areas support a sparse community of plants that can exist in the small pockets of soil that accumulate in rock cracks, including several rare plant species (Section 3.4.4, *Rare Plants*). On the crest of Umtanum Ridge and to the south, several plant communities are mapped, including big sagebrush-spiny hopsage/Sandberg's bluegrass-cheatgrass and bunchgrass-cheatgrass communities.

On the Hanford Site and the proposed Wautoma substation, the vegetation is mainly shrub-steppe or grassland with some agricultural land. WDFW documents the presence of nearly pristine sagebrush/bluebunch wheatgrass shrub-steppe on the summit of Yakima Ridge (WDFW, 2001a). Segment D would terminate at the proposed Wautoma substation. The vegetation at the proposed substation site

is described in the Segment C discussion (See Section 3.4.2.3, *Segment C*).

3.4.2.5 Segment E

The vegetation of Segment E is mainly shrubland with some grasslands and agricultural lands. The large emergent wetland south of Lower Crab Creek Road is vegetated with cat-tails and bulrush. To the south, scattered willows line the northern shore of Lower Crab Creek. The south shore of Lower Crab Creek consists of an emergent wetland vegetated with rushes, cat-tails, grasses, forbs, with scattered Russian olive (WDFW, April 2, 2001). To the south, the rocky, steep slopes on the north side of Saddle Mountains are described as having sparse shrub-steppe vegetation in areas with gentler slopes. The agricultural lands in the valley are mainly in cropland with small adjacent areas that may have some remnants of native plant communities.

The Saddle Mountains Unit of the Hanford Reach National Monument is characterized as relatively undisturbed or recovering shrub-steppe habitat, with some sand dune areas dominated by grasses, and water influenced areas mapped as riparian areas (USDOE, 2001, Sackschewsky and Downs, 2001). Hanford Site plant community maps depict three communities in the northeastern portion of the Saddle Mountains Unit, including big sagebrush/bunchgrasses-cheatgrass, big sagebrush-spiny hopsage/bunchgrasses-cheatgrass, and a small area of rabbitbrush/bunchgrass. To the south, a large area of bitterbrush/bunchgrass sand dune complex is mapped between two large wetland areas. These communities are considered “Plant Communities of Concern on the Hanford Site” (USDOE, 2001).

The bitterbrush/Indian ricegrass shrubland north of the Columbia River is a WNHP high quality native plant community. This community extends along the river for several miles, including about 2.5 miles along Segment E. This sand dune community was described in Section 3.4.2.4, *Segment D*.

Wetland plant communities, dominated by herbaceous species and scattered shrubs, occur in the Saddle Mountain Wasteway, north of the Columbia River. Wetland plant communities do not occur along the shoreline of the Columbia River, except possibly for a narrow herbaceous wetland along the shoreline.

3.4.2.6 Segment F

The vegetation of Segment F is mainly shrubland with some grasslands and very little agricultural land. Immediately north of Lower Crab Creek, a dune/willow complex occurs in the area of the proposed line (WDFW, April 2, 2001). This area may be somewhat degraded due

to ATV use. The south shore of Lower Crab Creek consists of an emergent wetland vegetated with rushes, cat-tails, grasses, forbs, with scattered Russian olive. To the south, the rocky, steep slopes on the north side of Saddle Mountains are described as having sparse shrub-steppe vegetation in areas with gentler slopes.

Segment F traverses the Saddle Mountains from west to east, mainly along BLM land. BLM has not mapped plant communities in this area (P. Camp, Pers. Comm. 2001). This dry south-facing slope is mainly vegetated with grasses, with very few shrubs due to fires in the past. Scattered shrubs occur, mainly in the drainageways of intermittent creeks.

As described under Segment D, the area to the north of the Columbia River, in the Hanford Reach National Monument, is characterized as relatively undisturbed or recovering shrub-steppe habitat, with some sand dune areas dominated by grasses, and water-influenced areas mapped as riparian areas (USDOE, 2001).

The bitterbrush/Indian ricegrass shrubland that occurs north of the Columbia River along Segment F is a WNHP high quality native plant community. This community extends along Segment F for approximately 0.3 mile.

3.4.3 Weed Species

Some plant species are designated as weeds by federal or state law. Past land uses in the proposed study area, such as grazing and road building, have disturbed native plant communities and favored the establishment of some weed species. Present land uses, such as the use of vehicles along dirt roads or off-road and the expansion of agriculture, continue to contribute to the spread of weed species. However, some weeds do not require disturbances in order to thrive and are able to invade natural areas quickly.

Weed species have numerous detrimental effects, and their invasion of public and private lands is a matter of great concern. Weed species reduce the quality of shrub-steppe by replacing native species, and some form **monocultures**, which displace the more diverse native plant communities and reduce **biodiversity**. Weeds reduce the quality of wildlife habitat when they replace native food sources and plant cover species, and can have an economic impact on agricultural crops. Some contribute to the rapid spread of fire by providing fuel. In addition, most weeds are not as efficient as native species at binding soil, which contributes to soil erosion by water and wind.

In Washington, weed species are addressed on a county-by-county basis. Washington State law designates some particularly troublesome

➡ For Your Information

A **monoculture** is the growth of a single species, tending to exclude other species, resulting in a decrease in biodiversity.

Biodiversity refers to different species of plants and animals in an environment.

weeds as “noxious weed” species. The list of noxious weed species is divided into three classes (A, B, and C) within each county, based on the state of invasion. Table 3.4-3, *Weeds of Concern in Study Area*, lists the **Class A** and **Class B** weeds that are of concern within each project segment.

Class B and **Class C weeds** are also present in the study area and may be controlled as a local option, depending on the level of threat. Spiny cocklebur, a Class C weed found in Kittitas County, is present in some areas (Segments A, B_{SOUTH}, B_{NORTH}, and C). Bull thistle and Canada thistle are Class C or Education List weed species, found throughout the entire study area. They will spread into most disturbed areas.

Some weed species are monitored by the state when they are suspected to be a potential threat or if more information is needed on the species. Russian olive and saltcedar (a Class A Noxious Weed) as well as common reed are monitored in the state of Washington. It is found in some wetlands on Hanford Site (Segments E and F), where efforts are being made to eliminate known occurrences (D. Gonzales, Pers. Comm., 2001). Russian thistle, a weed known to occur on the YTC (Segment C), is also a monitor species (M. Pounds, Pers. Comm., 2001).

Table 3.4-3
Weeds of Concern in Study Area

Common Name Scientific Name (Washington State Class*)	Kittitas County	Yakima County	Grant County	Benton County
	Segments A, B, C	Segment C	Segments D, E, F	Segments D, E, F
Dalmatian toadflax <i>Linaria dalmaticasp. dalmatica</i> (Class B)	X	X	--	--
Johnsongrass <i>Sorghum halepense</i> (Class A)	-	X	--	--
Knapweed, diffuse <i>Centaurea diffusa</i> (Class B) except Benton County – no class	X YTC	X YTC	X HAN BLM	X HAN
Knapweed, spotted <i>Centaurea biebersteinii</i> (Class B)	X YTC	X YTC	X BLM	X
Knapweed, Russian <i>Acroptilon repens</i> (Class B)	YTC	X YTC	X HAN	X HAN
Kochia <i>Kochia scoparia</i> (Class B)	YTC	YTC	--	X
Musk Thistle <i>Carduus nutans</i> (Class B)	X	X	X	--
Pepperweed, perennial <i>Lepidium latifolium</i> (Class B)	YTC	YTC	--	--

➔ For Your Information

State and federal agencies were contacted for information on weed species of concern in the study area. Weed board personnel in Kittitas, Grant, Yakima, and Benton counties provided information on the species of particular concern in the study area.

Class A Weeds are non-native species with a limited distribution in Washington. Preventing new infestations and eradicating existing infestations is the highest priority. Eradication is required by law.

Class B Weeds are noxious weeds that are not native to the state and are of limited distribution or are unrecorded in a region of the state and that pose a serious threat to that region.

Class C Weeds are widely established and have interest to the agricultural industry. Some of these weeds are controlled on a local basis, depending on local threats and the feasibility of control.

Common Name Scientific Name (Washington State Class*)	Kittitas County	Yakima County	Grant County	Benton County
	Segments A, B, C	Segment C	Segments D, E, F	Segments D, E, F
Puncturevine <i>Tribulus terrestris</i> (Class B) Grant County <i>Education list</i> Benton County	-	--	HAN	HAN
Purple loosestrife <i>Lythrum salicaria</i> (Class B)	X YTC	X YTC	--	HAN
Rush Skeletonweed <i>Chondrilla juncea</i> (Class B)	--	--	X BLM	X
Scotch thistle <i>Onopordum a. canthoides</i> (Class B)	YTC	X YTC	--	--
Sowthistle, perennial <i>Sonchus arvensis</i> (Class B)	YTC	YTC	--	--

X species name provided by County Weed Board staff

BLM species name provided by BLM personnel

YTC species name found within the YTC Management Plan

HAN species name provided by Hanford Reach National Monument personnel

3.4.4 Rare Plants

Rare plant species vary depending on the land ownership. Table 3.4-4, *Rare Species Addressed in Different Land Ownership Categories*, identifies land ownership categories and the status of species that will be considered within each of these categories.

➔ For Your Information

The study area for rare plants includes an area 1 mile on either side of each of the segment centerline, for a total of a 2-mile-wide strip. To address known occurrences of rare plant species that may be directly impacted by project activities, occurrences in the "immediate area" of the proposed line are those within 500 feet on either side of the line.

Extirpated is a species that is no longer known to occur in a given geographic area.

Table 3.4-4
Rare Species Addressed in
Different Land Ownership Categories

Land Ownership/Management Category	Status of Plant Species
BLM	BLM sensitive species which includes federally listed, proposed, and candidate species and state rare species
All federally managed lands except BLM lands	Federally listed, proposed, and candidate species, federal species of concern, state listed species.
State owned Lands	Federally listed, proposed, candidate species, and species of concern; state endangered, threatened, and sensitive species, and a state category that includes species that are possibly extinct or extirpated in Washington
Private Lands	Federally listed, proposed, and candidate species

Information gathered on rare plant species includes the location of known occurrences and potential habitat for rare plant species. Information on known occurrences, habitat preferences, and potential habitats of federally listed and candidate rare plant species are discussed below. Information on federal species of concern, BLM

sensitive species, and state rare plant species includes known occurrences of these species within the study area.

3.4.4.1 Federal Listed Plants

The USFWS identified a federally listed threatened species and three federal candidate species with the potential to occur within the study area (USFWS, 2001). Table 3.4-5, *Federal Status Plant Species with the Potential to Occur in the Study Area*, lists the habitat and known occurrences of federal status species within the vicinity of the study area. These plants are also listed by the State of Washington (See Table 3.4-8, *Known Occurrences of Rare Plant Species*). A detailed description of these species is in Appendix E, *Vegetation*.

Table 3.4-5
Federal Status Plant Species with the Potential to
Occur in the Study Area

Common Name Scientific Name	Federal Status	Habitat Preference and Plant Associations	Known Occurrence(s) in the Vicinity of the Study area
Ute ladies' tresses <i>Spiranthes diluvialis</i>	Threatened	Low elevation wetlands in valleys - associated with spikerush, sedges, grasses, and rushes	None
Northern wormwood <i>Artemisia campestris</i> var. <i>wormskioldii</i>	Candidate	Grows only within the floodplain of the Columbia River in relatively level, arid, shrub-steppe, on basalt, compacted cobble, and sand - associated with sagebrush and grasses	None within 1 mile of line segments. Several occurrences within the floodplain of the Columbia River, several miles south of the Segment B river crossing.
Basalt daisy <i>Erigeron basalticus</i>	Candidate	Grows in crevices in basalt cliffs on canyon walls facing north, east, or west, from 1,250 to 1,500 feet in elevation - associated with a few grass and forb species	None within 1 mile of line segments. Occurs within Kittitas and Yakima counties along the Yakima River and Selah Creek; within the YTC, approximately 10 miles west of Segment C.
Umtanum wild buckwheat <i>Eriogonum codium</i>	Candidate	Found on the exposed tops of a ridgeline that is composed of basalt, from 1,100 to 1,320 feet in elevation - associated with cheatgrass and a variety of forbs.	One known population, on part of Umtanum Ridge, in Benton County.

Potential habitat for federal listed and candidate species occurs within the study area. Potential habitat includes any areas that meet the known habitat requirements for that species. Table 3.4-6, *Habitat for Federal Listed Plant Species*, lists the project segments that may contain potential habitat for federally listed and candidate species.

Because limited information is available on known occurrences of rare plant species, a preliminary rare plant field survey was conducted in August 2001 to determine where potential rare plant habitat occurs along the Preferred Alternative and to locate late blooming federally listed and candidate species. No federally listed plants were identified. The results of this survey will be used to plan additional rare plant surveys during the spring of 2002.

Table 3.4-6
Habitat for Federal Listed Plant Species

Common Name Scientific Name	Segments With Potential Habitat for Federal Listed and Candidate Rare Plant Species					
	A	B	C	D	E	F
Ute ladies' tresses <i>Spiranthes diluvialis</i>	■			■	■	■
Northern wormwood <i>Artemisia</i> <i>campestris</i> var. <i>wormskioldii</i>		■		■	■	■
Basalt daisy <i>Erigeron basalticus</i>			■	■		
Umtanum wild buckwheat <i>Eriogonum cadium</i>				■		

3.4.4.2 Federal Species of Concern

Five federal species of concern were identified by the USFWS (See Table 3.4-8, *Known Occurrences of Rare Plant Species*). These species are also listed by the State of Washington.

3.4.4.3 BLM Sensitive Species

The Wenatchee Resource Area of the Spokane BLM District provided the sensitive species list for BLM lands within each of the four counties within the study area (See Appendix E, *Vegetation*). Because detailed rare plant surveys have not been conducted on BLM lands within the study area, the BLM district botanist cautioned that it is impossible to determine with certainty which sensitive species might occur in the study area, without conducting field surveys (P. Camp, Pers. Comm. 2001).

The list of BLM sensitive species with the potential to occur along Segment F is included in Table 3.4-7, *BLM Sensitive Rare Plant Species*. The other project segments cross only a few sections or smaller portions of sections of BLM land than Segment F. Information on the species that might occur along project segments other than Segment F is not available from the BLM (Camp, Pers. Comm. 2001). For the Preferred Alternative, the BLM sensitive plant list will be narrowed down based on the habitat preferences to determine which species might occur in the geographic area. This list of BLM sensitive species with potential habitat along the Preferred Alternative will form the basis for the field surveys during the appropriate season in 2002.

**Table 3.4-7
BLM Sensitive Rare Plant Species**

Species Common Name <i>Scientific Name</i>	Habitat Requirements
Geyer's milk-vetch <i>Astragalus geyeri</i>	Occurs in depressions in mobile or stabilized dunes, sandy flats, and valley floors within grey rabbitbrush/Indian ricegrass communities.
Bristle-flowered collomia <i>Collomia macrocalyx</i>	Dry, open habitats, on talus, rock outcrops, and lithosols, in sparsely vegetated areas with a low species diversity; within sagebrush dominated communities.
Gray cryptantha <i>Cryptantha leucophaea</i>	Occurs in sandy areas, on slopes associated with big sagebrush, and grasses, including Indian ricegrass, needle-and-thread grass, Sandberg's bluegrass, cheatgrass, and various forb species.
Common blue-cup <i>Githopsis specularioides</i>	Open places at lower elevation, on thin soils over bedrock outcrops, talus slopes and gravelly areas.
Hoover's desert-parsley <i>Lomatium tuberosum</i>	Occurs in loose talus, typically on east and north-facing slopes, within big sagebrush/bluebunch wheatgrass communities; also found in talus in drainage channels on south-facing slopes.
Nuttall's sandwort <i>Minuartia nuttallii</i> var. <i>fragilis</i>	Sagebrush dominated hills to high elevation slopes, found mainly on gravelly benches or talus slopes.
Cespitose evening-primrose <i>Oenothera cespitosa</i> ssp. <i>cespitosa</i>	Occurs in open sites on talus or on rocky slopes and may colonize road cuts; associated with big sagebrush, occurs in sagebrush dominated communities associated with gray rabbitbrush, Sandberg's bluegrass, needle and thread grass, Indian ricegrass, Junegrass, and forbs.
Wanapum crazyweed <i>Oxytropis campestris</i> var. <i>wanapum</i>	Occurs on the summit of the Saddle Mountains, descending down the north slope; in deep sand in the big sagebrush/blue bunch wheatgrass community.
<i>Texosporum santi-jacobi</i>	A pin-head lichen that occurs on soils as part of biological crust.

3.4.4.4 Washington State Rare Plant Species

Known occurrences of state rare species within each segment, along lands of all ownership and management categories, are listed in Table 3.4-8, *Known Occurrences of Rare Plant Species*, (WNHP, 2001).

Five of these species are listed as federal species of concern. All state lands along the Preferred Alternative will be surveyed for state-listed and sensitive rare plant species. The list of rare plant species for each county along the Preferred Alternative, maintained by the WNHP, will be used to determine the species that may have potential habitat along the Preferred Alternative.

3.4.4.5 Known Rare Plant Occurrences by Segment

There are no known occurrences of federally listed species along any of the project segments. A federal candidate species, Umtanum wild buckwheat, occurs near part of Segment D. Federal species of concern and state status species occur in the area of all project segments.

Table 3.4-8, *Known Occurrences of Rare Plant Species*, lists known occurrences of rare plant species by segment. Known occurrences within the “immediate area” of the proposed line are estimated to be within 500 feet of either or both sides of the proposed line. A detailed description of the rare plant species found along each segment is found in Appendix E, *Vegetation*.

Table 3.4-8
Known Occurrences of Rare Plant Species**

Common Name <i>Scientific Name</i>	Federal Status	State Status	Known Occurrences of Rare Plant Species Along Segments						
			A	B ^{NORTH}	B ^{SOUTH}	C	D	E	F
Umtanum wild buckwheat <i>Eriogonum codium</i>	Candidate	Endangered					■*		
Columbia milk-vetch <i>Astragalus columbianus</i>	Species of Concern	Threatened		■*	■	■*	■*		
Gray cryptantha <i>Cryptantha leucophaea</i>	Species of Concern	Sensitive		■			■*	■*	
Hoover's desert-parsley <i>Lomatium tuberosum</i>	Species of Concern	Threatened					■*	■*	■*
Persistent-sepal yellowcress <i>Rorippa columbiae</i>	Species of Concern	Threatened					■*		
Hoover's tauschia <i>Tauschia hooveri</i>	Species of Concern	Threatened	■						
Dwarf evening-primrose <i>Camissonia pygmaea</i>	--	Threatened		■					■*
Pauper milk-vetch <i>Astragalus misellus</i> var. <i>pauper</i>	--	Sensitive	■						
Naked-stemmed evening-primrose <i>Camissonia scapoidea</i>	--	Sensitive		■	■				
Bristle-flowered collomia <i>Collomia macrocalyx</i>	--	Sensitive		■	■				
Beaked cryptantha <i>Cryptantha rostellata</i>	--	Sensitive	■	■	■				
Piper's daisy <i>Erigeron piperianus</i>	--	Sensitive					■*		■
Long-sepal gobemallow <i>Iliamna longisepala</i>	--	Sensitive	■						
Suksdorf's monkey-flower <i>Mimulus suksdorfii</i>	--	Sensitive	■*	■	■			■*	
Nuttall's sandwort <i>Minuartia nuttallii</i> var. <i>fragilis</i>	--	Sensitive							
Tufted evening-primrose <i>Oenothera cespitosa</i> ssp. <i>cespitosa</i>	--	Sensitive		■*	■	■	■		

*Occurrence in the immediate vicinity (within approximately 500 feet) of segment

**Does not include federal status plants that also have state status.

3.5 Wildlife

Approximately 150 wildlife species (birds, mammals, reptiles, and amphibians) are known to occupy shrub-steppe habitat (Johnson and O’Neil, 2001), which represents the majority of available habitat within the study area (See Section 3.4, *Vegetation*, for a detailed discussion of habitat types in the study area). Shrub-steppe is one of the most heavily fragmented habitat types in Washington, and has been designated a Priority Habitat by the State of Washington.

Of the 150 wildlife species known to occupy shrub-steppe habitats, approximately 50 are closely associated with shrub-steppe habitat, and the remaining species use shrub-steppe habitat occasionally or incidentally. These 150 species, however, do not represent the total number of species that may exist within the proposed study area. For example, a study of the Hanford Site documented 195 bird species in the general area where the project is proposed (Nature Conservancy, 1999). Many of these species are associated with open water habitats along the Columbia River.

For a complete discussion of the species and habitats present within the project area See Appendix F, *Fish and Wildlife Technical Report*.

3.5.1 Segment A

Wildlife populations along Segment A are generally typical of shrub-steppe habitats. The area is used as wintering grounds by large herds of mule deer (WDFW 2001a). The riparian areas of Wilson and Naneum creeks provide winter roosting and foraging habitat for bald eagles. A sagebrush vole was sighted near Schnebly Canyon (WDFW 2001a). Colockum Creek Canyon is a migration corridor for the Quilomene elk herd. East of Cooke Canyon, a sharp tailed grouse sighting within 1 mile of the proposed line was recorded in 1981 (WDFW 2001a). The area east of Cooke Canyon is also known to harbor nesting long-billed curlews.

The riparian zone of Wilson-Naneum Creek, where Segment A crosses, is in good condition with mature cottonwoods and a diverse assemblage of riparian shrubs. ***Large woody debris recruitment potential*** is higher in this area than in most of the rest of the watershed, due to the presence of large cottonwoods. The high quality of this particular section of Wilson and Naneum Creeks can be attested to by the fact that the area supports a large number of wintering bald eagles. The bald eagles rely on the large cottonwood trees for roosting and may use the open water areas of the stream to catch fish.

➔ For Your Information

Large woody debris recruitment potential is the potential for large trees to fall into the stream and provide fish habitat.

→ For Your Information

*Sage grouse gather in the spring at specific locations, called **leks**.*

Sage grouse have been repeatedly observed in the area surrounding the proposed line (Clausing, 2001). A sage grouse **lek** was observed in 1983 less than 1 mile southwest of the southern end of Segment A. White-tailed jackrabbits have also been observed near the southern end of Segment A.

The potential reroute of a portion of Segment A will change the location of the proposed alignment slightly to the south, but will not cross any significantly different wildlife habitat than the original location. Species present along the proposed reroute are expected to be similar to those discussed for the original Segment A alignment.

3.5.2 Segment B (Options B_{NORTH} and B_{SOUTH})

The affected environments for Options B_{NORTH} and B_{SOUTH} are effectively the same and are referred to as B. Segment B crosses three distinct areas:

- The majority of the proposed line crosses through the shrub-steppe of the YTC;
- At the eastern end, the proposed line crosses the steep cliffs and narrow riparian area of the Columbia River;
- The Vantage Substation lies on a plateau at the top of the east bank of the Columbia River.

The WDFW has indicated that sage grouse may be present in the area surrounding Segment B (Clausing, 2001). Loggerhead shrike, sage thrashers, sage sparrows, and Swainson's hawks are also known to occur in the general vicinity of the proposed ROW (Stepniewski, 1998, U.S. Army, 1996, WDFW 2001a).

→ For Your Information

*The **Pacific Flyway** is the path of migration for many different species of birds.*

***Neotropical** is the biogeographic region that extends south, east, and west from the central plateau of Mexico.*

Numerous species more often associated with wetlands and riparian habitats are found along Segment B, including ring-billed and California gulls, Caspian and Forster's terns, and Canadian geese. This section of the Columbia River is located within the **Pacific Flyway**, and during the spring and fall months the area serves as a resting point for **neotropical** migrants, migratory waterfowl, and shorebirds. During the fall and winter months, large numbers of migratory ducks (>100,000) and geese (>10,000) find refuge in the Wanapum reservoir (WDFW 2001a). Other species present during winter months include American white pelicans, double-crested cormorants, and common loons. Bald eagles winter along the Columbia River. An historical sighting of a desert nightsnake within 1 mile of the proposed project was made on the west shore of the Columbia River (WDFW 2001a).

The area surrounding the Vantage Substation contains a unique complex of basalt cliffs, sand dunes, shrub-steppe, and small

wetlands. High-quality riparian vegetation exists within the wetland areas. Species of special note have been recorded as using the area surrounding the Vantage Substation, including the striped whipsnake and the desert nightsnake (WDFW 2001a). Bird species often found along the Columbia River (see the Columbia River discussion above) also utilize the wetland areas.

3.5.3 Segment C

Seven distinct areas characterize the habitat of this route:

- Northern YTC area;
- Saddle Mountains;
- Central YTC area (including four drainage complexes);
- Umtanum Ridge;
- Cold Creek;
- Yakima Ridge; and
- Dry Creek.

The area between the Saddle Mountains and Umtanum Ridge is home to approximately 70 percent of the YTC mule deer population (300-400 deer). The upland areas near Hanson Creek support over 75 percent of the breeding populations of loggerhead shrike on the YTC, and also support Swainson's hawks (U.S. Army, 1996). The Hanson Creek riparian area on both sides of the proposed ROW has documented bald eagle winter roost sites (WDFW, 2001a, U.S. Army, 1996). Lewis's woodpeckers are also known to exist in the Hanson Creek Riparian area (U.S. Army, 1996). The Alkali Canyon Complex supports an historic sage grouse lek and known populations of nesting prairie falcons (U.S. Army, 1996). Cliffs in Corral Canyon downstream of the proposed route also have documented prairie falcon nests (U.S. Army, 1996, WDFW, 2001a). Breeding burrowing owls were sighted approximately 1.5 miles southwest of the proposed route between Corral Canyon and Sourdough Canyon in 1993 and 1994, but the nest was unoccupied in 1995-1997 (WDFW 2001a). Sage sparrows have also been observed in the Corral Canyon area (U.S. Army, 1996). Long billed curlews have been observed in the Corral Canyon Complex near the proposed route (Stepniewski, 1998).

Breeding sage grouse have been observed on the flatter areas of the south side of Umtanum Ridge. Several leks are located less than 1 mile west of the proposed route (WDFW 2001a). The WDFW indicates that this is considered the core area of one of the two remaining sage grouse populations in Washington (Clausing, 2001 and Schroeder, et. al. 2000). Merriam's shrews were caught in

research traps at the top of Umtanum Ridge near the proposed route (Wunder, et. al., 1994).

The Cold Creek canyon contains an important mixture of native shrub-steppe vegetation and riparian areas between the Hanford Reach National Monument area and the YTC, which acts as a corridor for wildlife moving to and from these locations. In addition, the Cold Creek canyon is one of the most important flyways in Washington for migrating birds (Stepniewski, 1998, Visser, 2001). Elk, deer, sage grouse, loggerhead shrike, and jackrabbits all use the Cold Creek canyon as a local migration corridor between the Hanford Reach National Monument and the YTC. Neotropical migrants, waterfowl, raptors, and many other bird species use the canyon as a migration corridor, as part of their longer journeys between regions north and south of Central Washington (Stepniewski, 1998). Many of these migrants may stop and temporarily use the riparian or upland habitats. Breeding Swainson's hawks and loggerhead shrikes have been documented within 1 mile of the proposed route (WDFW, 2001a, U.S. Army, 1996).

The entire eastern end of Yakima Ridge is considered a part of the Cold Creek migration corridor. On the south side of the ridge, a breeding prairie falcon was observed in 1988 within 1 mile of the proposed route (WDFW 2001a). Multiple sightings of breeding burrowing owls have been made in an area adjacent to where the proposed route crosses Highway 24 (WDFW 2001a).

Segment C terminates at the new Wautoma Substation just south of Yakima Ridge. The only documented species of note is a breeding colony of burrowing owls located approximately 0.5 mile southwest of the proposed substation (Corkran, 2001). Prime wintering habitat for the Hanford elk herd is located several miles east of the site along Dry Creek. It is likely that the Hanford elk herd, unique among elk herds because it exists exclusively in shrub-steppe habitat, could travel as far upstream as the proposed substation, since the numbers of elk have dramatically increased over the past several years and numerous reports of straying animals have been documented (WDFW, 2000).

3.5.4 Segment D

This proposed route segment crosses ten distinct areas:

- Vantage Substation area;
- Beverly area;
- Lower Crab Creek;
- Saddle Mountains;
- The Wahluke Slope;

- The Columbia River;
- Umtanum Ridge;
- Cold Creek drainage;
- Yakima Ridge; and
- Dry Creek.

The proposed route would enter the new Wautoma Substation area from the north. This area was discussed in the previous section (Section 3.5.3, *Segment C*).

Nightsnakes and striped whipsnakes have been documented adjacent to Segment D near the Vantage Substation. Bird species associated with the Columbia River may be incidental visitors to this area.

The Lower Crab Creek area is one of the most important waterfowl breeding grounds in Washington (Clausing, 2001). Many bird species also use the open water and wetlands for resting and feeding during their annual migrations along the Pacific Flyway. Beaver are found in some open water areas.

The Saddle Mountains area provides a variety of wildlife habitats including cliffs, talus slopes, benches, open grassy slopes, and shrub-steppe habitats. The steep north side has many steep rocky outcroppings, mostly located on the top third of the slope. Habitat for bats and raptors is abundant here. The crest of the Saddle Mountains has a unique dwarf shrub-steppe vegetation community with a number of rare plant species (Fisher, 2001). The south side contains some high-quality shrub-steppe vegetation that is relatively undisturbed. A designated sage grouse movement corridor exists along the south slope of the Saddle Mountains, although no sage grouse have been observed recently in the area (Schurger, 2001, Visser, 2001).

Large populations of Brewer's vesper, sage sparrows, sage thrasher, and other passerine bird species can be found in the spring and summer on the south side of the Saddle Mountains. The cliffs on the north and west side are home to many raptor species, including red-tailed, Swainson's, ferruginous and rough-legged hawks; prairie falcons; American kestrels; bald and golden eagles, and ravens. A golden eagle nest site is located less than 1 mile west of the proposed line in the Sentinel Bluffs, which lie above and just east of the Columbia River (WDFW 2001a). A prairie falcon nest site is located on the north slope of the Saddle Mountains just below the crest within 0.25 mile of the proposed line (WDFW 2001a). A striped whipsnake was sighted at the crest of the Saddle Mountains near the proposed line in 1979 (WDFW 2001a).

In the Wahluke Slope, mammal species present are limited to those that can tolerate high levels of disturbance, such as coyotes, raccoons, and a variety of rodent species. Structures such as barns and sheds provide roosting habitat for a number of bat species. Bird species present on the Wahluke Slope are also limited to those species that can tolerate high levels of human disturbance. Pheasant and quail utilize croplands. Red-winged and yellow-headed blackbirds may use the limited wetland areas associated with irrigation practices. Near the southern end of the area, a breeding loggerhead shrike was observed within 1 mile of the proposed route in 1993 (WDFW 2001a).

Like the Columbia River crossing described in Segment B, this section supports large numbers of wintering waterfowl and is located within the Pacific Flyway. During the spring and fall months it serves as a resting point for neotropical migrants, migratory waterfowl, and shorebirds. Bald eagles are present throughout the Hanford Reach during the winter, and feed on waterfowl and salmon carcasses. Several Swainson's hawk nests have been documented on the China Bar south of the Columbia River approximately 1 mile east of the proposed route (WDFW 2001a).

The cliffs of the north side of Umtanum Ridge harbor a large number of raptor species. Segment D passes close to a known prairie falcon nest. Other known prairie falcon nests are located within 1 to 2 miles on both sides of the proposed route (WDFW 2001a). A loggerhead shrike was sighted at the crest of Umtanum Ridge in 1994 (WDFW 2001a). On the south slope of Umtanum Ridge, a Swainson's hawk nest was observed in 1990 within the proposed route (WDFW 2001a). Three other Swainson's hawk nests are located within 1 mile of the proposed route (WDFW 2001a).

The broad valley of Cold Creek in this area contains a mixture of grassy shrub-steppe and agriculture. Cold Creek itself does not contain much riparian habitat in this area, but does have areas of relatively undisturbed shrub-steppe vegetation. As discussed in Segment C, Cold Creek acts as an important migration corridor of relatively undisturbed shrub-steppe habitat between the YTC and the Hanford Site along Cold Creek. The Cold Creek Valley is also a major bird migration corridor.

The Cold Creek migration corridor is used by elk, mule deer, sage grouse, jackrabbits, songbirds, and other animals traveling between the YTC and the Hanford Site (WDFW, 2001a, Clausing, 2001, Stepniowski, 1998). Neotropical migrants, waterfowl, raptors, and many other bird species use the canyon as a migration corridor as part of their longer journeys between regions north and south of Central Washington (Stepniowski, 1998). Many of these migrants may stop

and temporarily use the upland habitats. Nesting burrowing owls have been observed next to the proposed route near Highway 24 (WDFW 2001a). Prairie falcons, golden eagles, Swainson's hawks and Lewis' woodpeckers have all been observed using the Cold Creek valley for nesting or foraging near the proposed route crossing (Stepniewski, 1998).

3.5.5 Segment E

This proposed route segment crosses ten distinct areas:

- Vantage Substation area;
- Beverly area;
- Lower Crab Creek;
- Saddle Mountains;
- The Wahluke Slope;
- Hanford Reach National Monument/Columbia River;
- Umtanum Ridge;
- Cold Creek drainage;
- Yakima Ridge; and
- Dry Creek.

Segment E crosses the Vantage Substation, the Beverly area, Lower Crab Creek and the Saddle Mountains parallel to Segment D. It then crosses the Wahluke Slope through areas similar to those crossed by Segment D. The wildlife species and habitats in these areas have been discussed in the previous section (Section 3.5.4, *Segment D*).

In the northern part of the Hanford Reach National Monument where Segment E crosses Highway 24, burrowing owls have been observed (WDFW, 2001a). Near Saddle Mountain Lake, many observations of Woodhouse's Toads have been made. A herd of approximately 70 mule deer exists in the area east and south of Saddle Mountain Lake (WDFW, 2001a, Haas, 2001, Corkran, 2001). Closer to the Columbia River near the Saddle Mountain Wasteway, nesting Swainson's hawks and great blue herons have been observed. Sagebrush lizards and night snakes have been documented near the proposed ROW (Nature Conservancy, 2001). Sagebrush voles and pygmy rabbits are also known to exist in the Hanford Reach National Monument area near the proposed Segment E (Brunkal, 2001).

As with the rest of the Columbia River in central Washington, hundreds of thousands of waterfowl use the open water habitats and wetlands near proposed Segment E as breeding areas, over wintering

areas, or stopovers on spring and fall migrations. These species, as well as neotropical migrants, may be present in or near the river. Communal bald eagle roosts are located within 3 miles of each side of the proposed crossing.

3.5.6 Segment F

The proposed line crosses the following distinct areas:

- Vantage area;
- Lower Crab Creek;
- Saddle Mountains
- The Wahluke Slope;
- Hanford Reach National Monument; and
- The Columbia River.

Near the Vantage area, an observation of an Ord's kangaroo rat caught in a trap was made in 1987 within the proposed ROW (see the Lower Crab Creek discussion below for more information on Ord's kangaroo rat). A ferruginous hawk nest was observed in 1995, approximately 1 mile east of Segment F (WDFW 2001a).

Segment F crosses Lower Crab Creek approximately 1 mile east of where proposed Segments D and E would cross. More extensive wetlands, including Nunnally Lake, are present in this area than exist near Segments D and E. As discussed in the Segment D section, Lower Crab Creek and its associated wetlands and riparian areas are among the most important waterfowl breeding grounds in Washington. Nunnally Lake is an important habitat for waterfowl. An area of sand dunes and willows exists just north of Lower Crab Creek.

Nunnally Lake supports a large population (3,000 to 4,000) of wintering ducks. Quail have been observed using the varied habitats along the valley bottom. Also, within 0.5 mile of the proposed line, a number of Ord's kangaroo rats were caught in 1996 and 1997 (Gitzen, et. al., 2001). This sighting and the observation, made in 1987, 2 miles north of Lower Crab Creek (see the preceding Vantage Area discussion) are significant because they represent new sightings in areas where this species was not previously recorded.

The habitats and species of the western end of the Saddle Mountains where Segment F crosses were described in discussions of Segments D and E. Where Segment F turns east and follows the lower slope of the Saddle Mountains, different habitat conditions are encountered. On the south slope, the vegetation community changes from a sagebrush-dominated community on the west end to a grass-

dominated community on the east end. A number of canyons intersect the south slope, providing some rocky outcrop and talus slope habitats. No observations of unique wildlife species have been made in this area, however this may be due to the extremely limited access in the area. WDFW reports that sage grouse were historically present along the Saddle Mountains, and that the relatively intact shrub-steppe vegetation is still considered a migration corridor between the YTC and areas east of the Saddle Mountains (Clausing, 2001, Fisher, 2001). In addition, species such as prairie falcons, ferruginous hawks and loggerhead shrikes have been observed on the crest and the north slope of the Saddle Mountains, within several miles of the proposed line. The area surrounding the proposed ROW near the eastern most end of segment F supports one of the largest contiguous areas of occupied habitat for sage sparrows in Washington (Nature Conservancy, 1999).

South of Highway 24, the proposed Segment F drops over a steep slope approximately 200 feet into a large depression that contains Saddle Mountain Lake to the west. At the south end of the depression, the line intersects with proposed Segment E, and crosses the Columbia River. Near the top of this slope, a Swainson's hawk nest was observed near Segment F (WDFW, 2001a). A herd of approximately 40 mule deer was observed in the central part of the depression (Corkran, 2001). Near the southern end of the proposed segment, immature sage sparrows were observed within 1 mile of the proposed line in 1987 (WDFW, 2001a). Sagebrush lizards and nightsnakes have been documented near the proposed route (Nature Conservancy, 2001).

The proposed Segment F route crossing of the Columbia River follows the same alignment as Segment E. Wildlife habitats and species are the same as discussed in Segment E.

3.5.7 Threatened and Endangered Species

Four federally listed threatened, endangered, and proposed species were identified by USFWS as possibly occurring in the study area (See Table 3.5-1, *Possible Presence of State and Federal Listed Species Within Project Area*). These include the bald eagle, the Washington ground squirrel, the Mardon skipper, and the sage grouse. A detailed discussion of each species is presented in Appendix F, *Fish and Wildlife Technical Report*.

3.5.8 Federal Species of Concern and State Listed Species

A list of state and federal listed wildlife species that are known to exist within the four counties crossed by the proposed project is presented in Table 3.5-1, *Possible Presence of State and Federal Listed Species Within Project Area*. Table 3.5-1, *Possible Presence of State and*

Federal Listed Species Within Project Area, indicates which of these species could possibly occur along each line segment.

Table 3.5-1
Possible Presence of State and Federal Listed Species
Within Project Area

Species Name	Federal Status	State Status	Possible Presence by Line Segment	Document Occurrence Type
Birds				
Aleutian Canada goose	FSC	ST	B, D, E, F	M
Bald eagle	FT	ST	All segments	W
Golden eagle		SC	B, C, D, E, F	B
Ferruginous hawk	FSC	ST	All segments	B
Swainson's hawk		SM	All segments	B
Northern goshawk	FSC	SC	All segments	M
Peregrine falcon	FSC	SE	C, D, E, F	B
Swainson's hawk		SM	All segments	B
Osprey		SM	B, D, E, F	B
Prairie falcon		SM	All segments	B
Turkey vulture		SM	B, D, E, F	B
Prairie falcon		SM	C, D, E, F	B
Burrowing owl	FSC	SC	C, D, E, F	B
Northern Spotted Owl	FT	SE	None	N
Lewis' woodpecker		SC	A, C, D, E, F	B
Sage sparrow		SC	All segments	B
Sage thrasher		SC	All segments	B
Loggerhead shrike	FSC	SC	All segments	B
Long-billed curlew	FSC	SM	A, C, E, F	B
Western bluebird	FSC	SM	All segments	B
Ash-throated flycatcher	FSC	SM	None	N
Olive sided flycatcher	FSC		All segments	P
Little Willow flycatcher	FSC		All segments	P
Grasshopper sparrow	FSC	SM	C, E, F	B
Western sage grouse	FC	ST	A, C, F	B
Sharp tailed grouse	FSC	ST	None	H
American white pelican		SE	B, D, E, F	M
Harlequin duck	FSC		B, D, E, F	P
Common loon		SS	B, D, E, F	M
Marbled murrelet	FT	ST	None	N
Black tern	FSC	SM	B, D, E, F	M
Caspian tern		SM	B, D, E, F	M
Forster's tern		SM	B, D, E, F	M
Great blue heron		SM	B, D, E, F	B
Black-crowned night heron		SM	B, D, E, F	B
Mammals				
Gray wolf	FE	SE	None	N
Canada lynx	FT	ST	None	N
Grizzly bear	FT	SE	None	N

Species Name	Federal Status	State Status	Possible Presence by Line Segment	Document Occurrence Type
California bighorn sheep	FSC		B, D, E, F	P
Pacific fisher	FSC	SE	None	N
Wolverine	FSC	SC	None	N
Western gray squirrel	FSC	ST	None	N
Washington ground squirrel	FC	SC	D, E, F	H
Pygmy rabbit	FSC	SE	None	H
Ord's kangaroo rat		SM	B, D, E, F	P
Northern grasshopper mouse		SM	All segments	P
Sagebrush vole		SM	All segments	P
White-tailed jackrabbit		SC	All segments	B
Merriam's shrew		SC	All segments	B
Ord's kangaroo rat		SM	All segments	B
Potholes meadow vole	FSC		None	N
Sagebrush vole		SM	All segments	B
Pacific western big-eared bat	FSC	SC	All segments	P
Long-eared myotis	FSC	SM	All segments	P
Long-legged myotis	FSC	SM	All segments	P
Fringed myotis	FSC	SM	All segments	P
Western small-footed myotis	FSC	SM	All segments	P
Yuma myotis	FSC		All segments	P
Pallid bat		SM	All segments	P
Insects				
Mardon skipper	FC	SE	None	N
Persius' duskywing		SM	E	P
Reptiles & Amphibians				
Cascades frog	FSC		None	N
Larch Mountain salamander	FSC	SS	None	N
Northern leopard frog	FSC	SE	D, E, F	P
Red-legged frog	FSC		None	N
Tailed frog	FSC	SM	None	N
Spotted Frog	FSC	SE	All segments	P
Night snake		SM	B, D, E, F	P
Woodhouse's Toad		SM	E, F	B
Sagebrush lizard	FSC		All segments	B
Night snake		SM	All segments	B
Striped whipsnake		SC	All segments	B

Source: US Fish and Wildlife County Species Lists for Benton, Grant, Kittitas and Yakima Counties

Federal Status

FE = Endangered
 FT = Threatened
 FC = Candidate
 FSC = Species of Concern

State Status

SE = Endangered
 ST = Threatened
 SS = Sensitive
 SC = Candidate
 SM = Monitor

Presence

P = Present (general presence)
 B = Breeding
 M = Migrant
 W = Winter Resident
 N = Not Present
 H = Historically Present, Not Present Now

3.6 Fish Resources

The study area includes creeks, lakes, and other water bodies that may support fish. Only streams or water bodies with perennial flows that are affected by the project are discussed (See Map 6, *Fisheries*). Some intermittent streams may have fish present at times during the year, but usually in limited areas near a source of perennial water.

The most significant fish resources found within the study area are endangered anadromous salmonids such as salmon and steelhead. These fish are born and reared in small streams, then migrate down the Columbia River to the ocean. After several years in the ocean, they migrate upstream back to their native streams to spawn. Resident salmonids such as bull trout and rainbow trout are also important resources, as are a number of other cold and warm water fish species.

3.6.1 Segment A

Segment A crosses eight fish-bearing streams that drain the Wenatchee Mountains north of the study area. The major fish issue facing these streams is the lack of access between the Yakima River and the **headwater** areas due to obstructions from irrigation and agricultural operations in the lower sections.

3.6.1.1 Wilson-Naneum Creek Crossing

The Wilson-Naneum Creek Complex is one of the more productive small streams in the study area. Fish species present here include steelhead, spring Chinook salmon, western brook lamprey, rainbow trout, cutthroat trout, brook trout, mountain whitefish, three-spine stickleback, speckled dace, longnose dace, bridgelip sucker, mountain sucker, reddsideshiner, and torrent sculpin (WDFW, 2001). There are currently no adult **anadromous salmonids** or lamprey spawning in the upper part of the creek due to obstructions, but migratory juvenile salmonids use the lower 2.1 miles as rearing habitat. At the site of the proposed crossing, there are no anadromous fish present, however the **non-anadromous** species mentioned above are likely to be present.

Since the proposed crossing is at the very upper edge of the Kittitas Valley, the stream at this point is relatively unaffected by irrigation withdrawals and other agricultural activities. The habitat conditions near the proposed crossing are good, with clean substrate and good instream flows.

→ For Your Information

Headwater refers to the source of the river.

Anadromous fish are ones that migrate up rivers from the sea to breed in fresh water.

Salmonid means belonging to the family Salmonidea, including salmon, trout, and whitefish.

Non-anadromous fish are ones that do not migrate to the sea and back during their life cycle.

3.6.1.2 Schnebly Creek Crossing

Schnebly Creek is a small stream with little suitable fish habitat near the study area. In its upper reaches, the stream supports rainbow trout (WDFW, 2001a), but it is unlikely to harbor fish where the proposed line crosses it.

3.6.1.3 Coleman Creek Crossing

Fish species present in Coleman Creek are similar to those in Wilson and Naneum Creeks and include steelhead, spring Chinook salmon, western brook lamprey, rainbow trout, cutthroat trout, brook trout, mountain whitefish, three-spine stickleback, speckled dace, longnose dace, bridgelip sucker, mountain sucker, redbreast shiner, and torrent sculpin. Bull trout were last observed in 1970 (WDFW, unpub.). Coleman Creek has been channelized and diverted into Naneum Creek and no longer has its natural mouth. There are currently no adult anadromous salmonid spawning in this creek due to obstructions, but migratory juvenile salmonids use the lower 0.5 mile as rearing habitat.

The lower reach of Coleman Creek has some of the best salmonid rearing habitat in the northern Kittitas Valley area. Higher upstream, the riparian zone of the valley portions of this stream is extensively impacted by grazing and other agricultural practices. The proposed crossing of Coleman Creek is just above the Kittitas Valley floor. The stream flows through a shallow canyon with a narrow riparian area. Stream habitat is good, with clean substrates, good water quality and good year-round flows. WDFW PHS data (WDFW, unpub.) indicates that fish are present only from the mouth upstream to a point approximately 2 miles below where the proposed line crosses. However, Renfrow (2001), and WDFW (unpub.) have indicated that the stream near the proposed crossing probably contains many of the species present lower in the system, except anadromous fish.

3.6.1.4 Cooke Canyon Creek Crossing

Fish species present in Cooke Canyon Creek include rainbow trout, cutthroat trout, and brook trout. No anadromous salmonids are present due to downstream obstructions (WDFW, unpub.).

Segment A crosses Cooke Canyon Creek at Coleman Canyon Road. The stream is divided into multiple small channels in this area. A good riparian area with large cottonwoods and willows exists upstream of Coleman Canyon Road. Downstream of the road, the riparian vegetation consists of smaller shrubs and trees. Stream flow is good in this area, although the split channels may limit available fish habitat. Stream substrate appears clean and the riparian areas are good, although livestock are present in the area upstream of the

crossing. Like Coleman Creek, the WDFW PHS data (2001a) indicates that fish species are probably only present downstream several miles from the proposed crossing. However, Renfrow (2001) indicated that the three trout species were probably present higher in the drainage above the study area, and may be present where the proposed line crosses.

3.6.1.5 Caribou Creek Crossing

Fish species present in Caribou Creek are probably limited to rainbow trout (WDFW, 2001a, WDFW unpub.). No anadromous salmonids are present due to downstream obstructions. Segment A crosses Caribou Creek adjacent to a large cultivated field. The creek here is very narrow, with a marginal riparian area and low flows. Fish habitat is marginal and it is unlikely that rainbow trout are present in large numbers in this area.

3.6.1.6 Parke Creek Crossing

Fish species present in Parke Creek are probably limited to rainbow trout (WDFW, 2001a, WDFW unpub.). No anadromous salmonids are present due to downstream obstructions. Segment A spans Parke Creek from high ridges on either side of it. The creek here is narrow and possibly intermittent, with a marginal riparian area. It is unlikely that rainbow trout are present in this reach of Parke Creek.

3.6.1.7 Cooke Canyon Crossing (Segment A Reroute)

Segment A reroute crosses Cooke Canyon Creek approximately 0.3 mile south of the original Segment A crossing at Coleman Canyon Road. The stream is divided into multiple small channels in this area. The stream flows through an open shrub-steppe area with very little riparian vegetation present. Stream flow is good in this area, although the split channels may limit available fish habitat. Like the Segment A crossing, it is possible that rainbow, cutthroat, or brook trout may be encountered near where the project crosses Cooke Canyon Creek (Renfrow, 2001). No anadromous fish are present this high in Cooke Canyon Creek (WDFW, unpub.).

3.6.2 Segment B

The affected environments for Options B_{NORTH} and B_{SOUTH} are very similar and are discussed together as Segment B. The proposed project would cross two perennial drainages and the Columbia River between the northern end of Segment C and the Vantage Substation. The perennial drainages drain the northeastern corner of the YTC. Extensive past grazing, military maneuvers and other disturbances have caused changes in flow regimes and a general reduction in the quality of fish habitat within the two perennial drainages.

3.6.2.1 Middle Canyon Creek

The only documented fish species in Middle Canyon Creek is rainbow trout (U.S. Army, 1996). However, the proposed line crosses the intermittent headwaters area of Middle Canyon, where no trout habitat is available.

3.6.2.2 Johnson Creek

Fish species present in Johnson Creek include rainbow trout, possibly steelhead, Chinook salmon, three-spine stickleback, prickly sculpin, large scale sucker, and redbside shiner (U.S. Army, 1996). Chinook salmon utilize only the lower end of the creek near the Columbia River for juvenile rearing, and steelhead may be present in the lower reaches (Renfrow, 2001).

Base flows in Johnson Creek are low, due to an increase in storm runoff and a reduction in infiltration caused by compacted unvegetated soils from years of cattle grazing and military land uses. A general lack of riparian vegetation, coupled with low base flows, causes high water temperatures during the warmer months. This may limit the distribution of some fish species, particularly salmonids.

Segment B crosses in the middle reach of Johnson Creek, thus anadromous salmonids are unlikely to be present, although the other species known to exist in the creek are likely to be present.

3.6.2.3 Columbia River Crossing

The Columbia River hosts approximately 40 species of fish. Chinook salmon, sockeye salmon, steelhead, and Pacific lamprey use the Columbia River near the river crossing as a migration corridor between the ocean and upstream spawning areas, and for spawning and rearing. Fish commonly pursued for sport include whitefish, small-mouth bass, sturgeon, catfish, walleye and perch. Rough fish such as squawfish, carp, suckers, and shiners are also present in large numbers (USDOE, 1999).

The Wanapum dam **tailrace**, located directly underneath the proposed crossing, is an important fall Chinook salmon spawning area (USDOE, 1999). The Columbia River is on the 303(d) list for high temperature, pH levels, and dissolved gas.

For Your Information

Tailrace is the part of the millrace below the turbine through which the spent water flows.

3.6.3 Segment C

Segment C crosses six major drainages, all of which drain the interior of the YTC directly to the Columbia River. Fish are present in five of the six drainages crossed (no fish are present in Cold Creek).

3.6.3.1 Middle Canyon Creek

The crossing of Middle Canyon Creek is similar to that discussed in Segment B_{SOUTH}.

3.6.3.2 Johnson Creek

Fish species present in Johnson Creek include rainbow trout, possibly steelhead, Chinook salmon, three-spine stickleback, prickly sculpin, large scale sucker, and redbside shiner (U.S. Army, 1996). Chinook salmon utilize only the lower end of the creek near the Columbia River for juvenile rearing. Steelhead may be present in the lower reaches of Johnson Creek (Renfrow, 2001). Segment C crosses in the middle reach of Johnson Creek; thus, anadromous salmonids are unlikely to be present, although the other species known to exist in the creek are likely to be present.

3.6.3.3 Hanson Creek

Fish species present in Hanson Creek include eastern brook trout and fall Chinook (U.S. Army, 1996). Chinook salmon utilize only the lower reach of the creek near the Columbia River for juvenile rearing, and are not present near the proposed crossing.

3.6.3.4 Alkali Canyon Creek

Fish species present in Alkali Canyon Creek include rainbow trout, eastern brook trout, and fall Chinook (U.S. Army, 1996). Chinook salmon utilize only the lower reach of the creek near the Columbia River for juvenile rearing, and are not present near the proposed crossing.

3.6.3.5 Corral Canyon Creek

Chinook salmon is the only fish species present in Corral Canyon Creek. They only utilize the lower reach of the creek near the Columbia River for juvenile rearing, and are not present near the proposed crossing (U.S. Army, 1996).

3.6.3.6 Cold Creek

No fish are known to be present in Cold Creek.

3.6.4 Segment D

Segment D crosses three drainages: Lower Crab Creek, the Columbia River, and Cold Creek. A series of irrigation canals and drains are crossed on the Wahluke Slope, however these are not considered fish habitat. Depending on conditions and the availability of stable flows, fish could exist temporarily in some canals, but would most likely be introduced by humans or carried by birds from other water bodies and would not continue to thrive.

3.6.4.1 Lower Crab Creek

Fish species present in Lower Crab Creek include rainbow trout, brown trout, Chinook salmon, and possibly a remnant steelhead population (WDFW, 2001a, Renfrow, 2001). Segment D crosses the extreme lower reach of Lower Crab Creek just upstream of its confluence with the Columbia River. Lower Crab Creek could be used by most of the 40 Columbia River fish species on a temporary basis as well.

3.6.4.2 Columbia River

The Columbia River is habitat for approximately 40 species of fish. Like the Segment B crossing, Chinook salmon, sockeye salmon, steelhead, and Pacific lamprey use the Columbia River near the river crossing as a migration corridor to upstream spawning areas and for spawning and rearing. Fish commonly pursued for sport include whitefish, small-mouth bass, sturgeon, catfish, walleye and perch. Rough fish such as squawfish, carp, suckers, and shiners are also present in large numbers (USDOE, HCP EIS, 1999).

The area directly under the Segment D crossing, just upstream from the Vernita Bridge, is an important spawning area for fall Chinook salmon. This area represents the northern extent of the naturally spawning Hanford Reach population of fall Chinook, which is approximately 50-60 percent of the total fall Chinook runs in the Columbia River (USDOE, HCP EIS, 1999).

3.6.4.3 Cold Creek

No fish are known to be present in Cold Creek in the vicinity of the Segment D crossing.

3.6.5 Segment E

Segment E crosses two lakes and only two major drainages: Lower Crab Creek and the Columbia River. Like Segment D, a series of irrigation canals and drains are crossed on the Wahluke Slope, however these are not considered to be fish habitat.

3.6.5.1 No Wake Lake

No Wake Lake is a private constructed lake just north of Lower Crab Creek used for water skiing. It contains warm water species of fish.

3.6.5.2 Lower Crab Creek

Segment E crosses Lower Crab Creek several hundred feet upstream of proposed Segment D. Fish habitat and species are similar to those discussed in the Segment D section.

3.6.5.3 Saddle Mountain Lake

Saddle Mountain Lake contains only warmwater fish species such as yellow perch, pumpkinseed, bluegill, and crappie.

3.6.5.4 Columbia River

Segment E crosses the Hanford Reach of the Columbia River. The fish species and habitats are similar to the crossing described for Segment D.

3.6.6 Segment F

Segment F crosses one lake and only two major drainages: Lower Crab Creek and the Columbia River. However, unlike Segments D and E, each drainage has wetland areas and ponds associated with each of these crossings.

3.6.6.1 Nunnally Lake

Nunnally Lake is a pothole lake in the Lower Crab Creek valley. It is a high-use recreational area. Rainbow trout are stocked for sport fishing purposes. Warmwater species such as yellow perch, pumpkinseed, bluegill, and crappie may be present.

3.6.6.2 Lower Crab Creek

Segment F crosses Lower Crab Creek several hundred feet upstream of proposed Segment D and E. Fish habitat and species are similar to those discussed in the Segment D.

3.6.6.3 Columbia River

Segment F crossing of the Columbia River uses the same alignment as proposed Segment E, and has similar fish habitat and species to those discussed in Segment D.

For Your Information

*An **Evolutionarily Significant Unit (ESU)** is a population of a species with a distinct evolutionary history as defined by the National Marine Fisheries Service.*

*A **Distinct Population Segment (DPS)** is a population of a species with a distinct evolutionary history as defined by the U.S. Fish and Wildlife Service.*

3.6.7 Threatened and Endangered Species

The project area is within the range of three species (which includes three **Evolutionarily Significant Units**, or ESU's and one **Distinct Populations Segment**, or DPS) of threatened or endangered fish: Upper Columbia River spring-run Chinook salmon, Upper Columbia River steelhead, Middle Columbia River steelhead, and bull trout (See Table 3.6-1, *Fish Species Presence*, for their distribution within the project area). A full description of these species can be found in Appendix F, *Fish and Wildlife Technical Report*.

Table 3.6-1
Fish Species Presence

Perennial Water Name ¹	Segment Intercepting Waterbody						Fish Species Present In Waterbody ²	Comments
	A	B	C	D	E	F		
Wilson Creek	X						Chinook salmon (Federal Endangered, State Candidate), Mountain sucker (State Candidate), Rainbow trout, Cutthroat trout, Brook Trout, Mountain whitefish, 3-Spine stickleback, Speckled dace, Longnose dace, Redside shiner, Torrent sculpin, Brook lamprey	Wilson Creek has high quality fish habitat in the project area. Chinook salmon are only present in the lowest mile of the creek, and not in the project area. Mountain suckers are probably found in the project area.
Naneum Creek	X						Chinook salmon (Federal Endangered, State Candidate), Mountain sucker (State Candidate), Rainbow trout, Cutthroat trout, Brook Trout, Mountain whitefish, 3-Spine stickleback, Speckled dace, Longnose dace, Redside shiner, Torrent sculpin, Brook lamprey	Naneum Creek has high quality fish habitat in the project area. Chinook salmon are only present in the lowest mile of the creek, and not in the project area. Mountain suckers are probably found in the project area.
Cave Canyon Creek	X						None	Fish habitat is present, but fish are not documented in this creek.
Schnebly Creek	X						Rainbow trout	Rainbow trout are present in the project area.
Coleman Creek	X						Chinook salmon (Federal Endangered, State Candidate), Bull trout (Federal Threatened, State Candidate), Rainbow Trout	Chinook salmon habitat is high quality, but limited to the lowest three miles of the stream. Bull trout have not been observed since 1970.
Cooke Canyon Creek	X						Rainbow trout, Cutthroat Trout, Brook trout	Cooke Canyon Creek is split into several small channels in the project area, which may limit the available fish habitat.
Caribou Creek	X						Rainbow trout	Caribou Creek has marginal fish habitat in the project area.
Parke Creek	X						Rainbow trout	Rainbow trout are present in the project area.
Middle Canyon Creek		X					Rainbow trout	Project crosses the intermittent headwaters of Middle Canyon Creek. It is unlikely that habitat in this area is utilized by fish.
Johnson Creek		X	X				Chinook salmon (Federal Endangered, State Candidate), Steelhead trout (Federal Endangered/Threatened, State Candidate), Rainbow trout, 3-Spine stickleback, Prickly sculpin, Large scale sucker, Redside shiner	Juvenile Chinook salmon only use the lowest reach of the stream for resting as they migrate down the Columbia River. Steelhead may spawn and rear in the lowest reach near the mouth. Resident fish habitat is degraded in the project area due to military operations, grazing and fires, but fish are present.
Hanson Creek			X				Chinook salmon (Federal Endangered, State Candidate), Rainbow trout, Brook trout	Juvenile Chinook salmon only use the lowest reach of the stream for resting as they migrate down the Columbia River. Resident fish habitat is degraded in the project area due to military operations, grazing and fires, but fish are present.

Perennial Water Name ¹	Segment Intercepting Waterbody						Fish Species Present In Waterbody ²	Comments
	A	B	C	D	E	F		
Alkali Canyon Creek			X				Chinook salmon (Federal Endangered, State Candidate) , Rainbow trout, Brook trout	Juvenile Chinook salmon only use the lowest reach of the stream for resting as they migrate down the Columbia River. Resident fish habitat is degraded in the project area due to military operations, grazing and fires, but fish are present.
Corral Canyon Creek			X				Chinook Salmon (Federal Endangered, State Candidate)	Juvenile Chinook salmon only use the lowest reach of the stream for resting as they migrate down the Columbia River. Resident fish habitat is degraded in the project area due to military operations, grazing and fires, and fish are not present.
Cold Creek			X	X			None	Cold Creek is intermittent in the project area, and no fish are present.
Crab Creek				X	X	X	Chinook salmon (Federal Endangered, State Candidate) , Steelhead trout (Federal Endangered/Threatened, State Candidate) , Rainbow trout, Brown trout, Various warmwater fish species	Crab Creek supports a wide variety of fish, including many of those found in the Columbia River.
Nunnally Lake						X	Rainbow trout, various warmwater species	Nunnally Lake is stocked with Rainbow trout for sportfishing.
Saddle Mountain Lake				X	X		Various warmwater species	Saddle Mountain Lake is an irrigation return flow lake.
Columbia River		X		X	X	X	Chinook salmon (Federal Endangered, State Candidate) , Steelhead trout (Federal Endangered/Threatened, State Candidate) , Pacific lamprey , Brook lamprey, Various warmwater species (40 different species all together)	The Columbia River supports approximately 40 different species of fish, and is the major migration corridor for anadromous species.
¹ Only streams or lakes that contain water year around are listed here.								
² Fish species that may be present in the waterbody. In some cases fish may be present somewhere in the waterbody, but not where the proposed project crosses it. Bold species are federal or state listed species.								

3.7 Land Use

The study area is defined as the proposed ROW width (150 feet) plus the separation distance, if necessary, between existing ROW and proposed ROW. The study area includes both private and public lands and avoids all incorporated areas (See Map 7, *Land Ownership*).

3.7.1 Location of Study Area

Line segments cross private lands and publicly administered lands in four Washington counties: Kittitas, Grant, Benton, and Yakima. See Table 3.7-1, *Counties Crossed by Segment*. Table 3.7-2, *Private and Publicly Administered Lands in Project Area*, lists the distance of private and publicly administered lands crossed. Map 7, *Land Ownership*, shows land ownership within the project area. Map 8, *Hanford Site*, shows a detail of public lands on the Hanford Site. Appendix G, *Local Plan Consistency*, discusses the local government regulations for these counties.

Table 3.7-1
Counties Crossed by Segment

Line Segment	County			
	Kittitas	Grant	Benton	Yakima
A	✓			
B	✓	✓		
C	✓		✓	✓
D		✓	✓	
E		✓	✓	
F		✓	✓	

Table 3.7-2
Private and Publicly Administered Lands in Project Area

Administering Agency	Distance and Percentage of Each Segment							Total Distance
	A	B ^{NORTH}	B ^{SOUTH}	C	D	E	F	
Private	20.28 mi 69.0%	1.75 mi 18.4%	1.75 16.9%	4.70 mi 15.8%	15.44 mi 56.7 %	7.71 mi 33.3%	3.95 mi 12.3%	55.58 mi 34.4%
DNR	2.04 mi 7%			0.45 mi 1.5%	2.08 mi 7.6%	0.56 mi 2.4%	2.5 mi 7.8%	7.63 mi 4.7%
WDFW							0.8 mi 2.5%	0.8 mi 0.5%
BLM	1.5 mi 5.1%			0.21 mi 0.7%	2.87 mi 10.6%	4.89 mi 21.1%	12.77 mi 39.8%	22.24 mi 13.8%
DOD	5.6 mi 19.0%	7.3 mi 76.6%	8.13 mi 78.5%	24.45 mi 82.0%				45.48 mi 28.2%
BOR		0.48 mi 5%	0.48 mi 4.6%		2.46 mi 9%	3.37 mi 14.6%	4.35 mi 13.6%	11.14 mi 6.9%
USFWS					0.51 mi 1.9%	0.96 mi 4.2%		1.47 mi 0.9%
USDOE					3.87 mi 14.2%	5.64 mi 24.4%	7.69 mi 24.0%	17.2 mi 10.6%
Total Public	9.14 mi 31.1%	7.78 mi 81.6%	8.61 mi 83.1%	25.11 mi 84.2%	11.79 mi 43.2%	15.42 mi 66.5%	28.11 mi 87.7%	105.96 mi 65.6%
Total Distance	29.42 mi	9.53 mi	10.36 mi	29.81 mi	27.23 mi	23.13 mi	32.06 mi	161.54 mi

3.7.1.1 Kittitas County

Kittitas County lies within the upper Yakima River watershed and on the east side of the Cascade Mountains. Mountains and steep hills ring an extensive irrigated area known as the Kittitas Valley where most of the County's residents live. Major irrigation projects of the 1940's and 50's distributed water to the valley floor, turning arid lands into productive farmland.

Segment A is entirely within the County. The majority of Segment B and a portion of Segment C are also within the County. Segments A and B cross both private lands and publicly administered lands. Segment C in Kittitas County would be located completely on publicly administered lands.

3.7.1.2 Grant County

The Columbia River flows in a deep valley along the west and southwestern boundary of Grant County. The County is a state and national leader in the production of wheat, corn, hay, potatoes, and several tree fruits and is a major livestock production center. Agricultural areas are concentrated throughout the County and the location of agriculture has been strongly influenced by the construction of irrigation facilities.

A small portion of Segment B and the majority of Segments D, E, and F are located within the County. These line segments cross both private lands and publicly administered lands.

3.7.1.3 Benton County

Benton County is located in the central part of the Columbia Basin. The principal land use is commercial dryland and irrigated agriculture with its related industries such as storage, shipping, processing, and sales of chemicals and equipment. Irrigated crop production and dryland agriculture is located throughout the agricultural lands designation. It is estimated that 17 percent of Benton County is irrigated land and 50 percent is range and dryland agriculture. Major crops in Benton County are wheat, corn, potatoes, apples, cherries, hops, mint, alfalfa hay, and wine grapes. Beef cattle are also raised in the County.

Of the overall study area, a small portion of Segment D and even smaller portions of Segments C, E, and F traverse through and terminate in Benton County. Segments C and D would cross both private lands and publicly administered lands. Segments E and F would only cross publicly administered lands.

3.7.1.4 Yakima County

Agriculture and related industries are the leading industries in Yakima County. The location of agriculture has been strongly influenced by the construction of irrigation facilities. Cultivated agriculture in Yakima County is heavily concentrated in and around the valley floors, while grazing lands and most orchards are located along many of the hillsides.

Only Segment C would pass through Yakima County, on private lands as well as publicly administered lands.

3.7.2 Land Uses in Study Area

Table 3.7-3, *Land Uses Crossed by Each Line Segment*, identifies the length of various land uses that are crossed by each segment. Public and private land uses are combined for this table.

Table 3.7-3
Land Uses Crossed by Each Line Segment

Land Use	Distance and Percentage of Each Segment							Total Distance
	A	B _{NORTH}	B _{SOUTH}	C	D	E	F	
Commercial, Industrial, and Transportation	0.26 mi 0.9%	0.01 mi 0.1%	0.01 mi 0.1%	0.03 mi 0.1%	0.49 mi 1.8%	0.03 mi 0.1%	0.09 mi 0.3%	0.92 mi 0.6%
Residential	0%	0%	0%	0.02 mi 0.1%	0.09 mi 0.3%	0.02 mi 0.1%	0%	0.13 mi 0.1%
Forest	0.68 mi 2.3%	0%	0%	0.19 mi 0.6%	0.18 mi 0.7%	0.05 mi 0.2%	0%	1.1 mi 0.7%
Range	27.95 mi 95%	9.04 mi 94.9%	9.87 mi 95.3%	29.55 mi 99.1%	17.32 mi 63.7%	16.91 mi 73.1%	30.99 mi 96.7%	141.6 mi 87.7%
Agricultural	0.53 mi 1.8%	0%	0%	0.01 mi >0.1%	8.85 mi 32.4%	5.87 mi 25.4%	0.39 mi 1.2%	15.6 mi 9.7%
Water	0%	0.48 mi 5%	0.48 mi 4.6%	0.02 mi >0.1%	0.3 mi 1.1%	0.25 mi 1.1%	0.59 mi 1.8%	2.12 mi 1.3%
Total Distance	29.42 mi	9.53 mi	10.36 mi	29.81 mi	27.23 mi	23.13 mi	32.06 mi	161.54 mi

The majority of land crossed by the various segments is rangeland, approximately 141.6 miles or 88 percent of the total lands crossed. The second most frequently crossed lands are used for agricultural purposes, approximately 15.6 miles or almost 10 percent of the total lands crossed.

Map 9, *Land Use Cover*, shows the various land uses along the different line segments.

3.7.2.1 Private Lands

As shown in Table 3.7-4, *Distance of Private Land Uses Crossed by Project Area*, roughly 35 percent of the study area is located on privately owned land. Private land ownership in the study area is characterized by open rangeland, agricultural land, open space, some rural residential, and a limited amount of quarrying. Table 3.7-4,

Distance of Private Land Uses Crossed by Project Area, identifies the total distance each land use would be crossed by the various line segments on privately owned lands.

Table 3.7-4
Distance of Private Land Uses Crossed by Project Area

Land Use	Distance of Each Segment							Total Distance
	A	B _{NORTH}	B _{SOUTH}	C	D	E	F	
Commercial, Industrial, and Transportation	0.25 mi	0.01 mi	0.01 mi	0.03 mi	0.27 mi	0	0	0.57 mi
Residential	0	0	0	0	0.04 mi	0	0	0.04 mi
Forest	0.42 mi	0	0	0	0.13 mi	0	0	0.55 mi
Range	18.82 mi	1.29 mi	1.29 mi	5.08 mi	7.21 mi	3.92 mi	4.03 mi	41.64 mi
Agricultural	0.53 mi	0	0	0	7.78 mi	4.29 mi	0	12.60 mi
Water	0	0.45 mi	0.45 mi	0	0.04 mi	0.19 mi	0	1.13 mi
Total Distance	20.02 mi	1.75 mi	1.75 mi	5.11 mi	15.47 mi	8.4 mi	4.03 mi	56.53 mi

3.7.2.2 Public Agency Administered Lands

In addition to the privately held lands, there are seven public agencies that administer lands crossed in the four counties. The public land areas crossed are under the administration of two Washington State agencies, Department of Natural Resources (DNR) and Washington Department of Fish and Wildlife (WDFW), and five federal agencies: Bureau of Land Management (BLM), Department of Defense (DOD), Bureau of Reclamation (BOR), U.S. Fish and Wildlife Service (USFWS), and U.S. Department of Energy (USDOE). Table 3.7-5, *State and Federal Agency Land by County*, identifies the state or federal agencies that administer land crossed per county.

Table 3.7-5
State and Federal Agency Land by County

Agency	County			
	Kittitas	Grant	Benton	Yakima
DNR	✓	✓	✓	✓
WDFW		✓		
BLM	✓	✓	✓	
DOD	✓			✓
BOR	✓	✓		
USFWS		✓		
USDOE		✓	✓	

As shown in Table 3.7-6, *Distance of Public Land Uses Crossed by Project Area*, roughly 65 percent of the study area is located on publicly administered land. Public land uses in the study area are predominantly agricultural, rangeland, wildlife habitat, and recreation. The study area also includes crossing the BLM Saddle Mountains Management Area, the Saddle Mountains Unit of the Hanford Reach

National Monument, Hanford Site, and Yakima Training Center. Table 3.7-6, *Distance of Public Land Uses Crossed by Project Area*, identifies the total distance each land use would be crossed by the various line segments on lands administered by a public agency.

Table 3.7-6
Distance of Public Land Uses Crossed by Project Area

Land Use	Distance of Each Segment							Total Distance
	A	B _{NORTH}	B _{SOUTH}	C	D	E	F	
Commercial, Industrial, and Transportation	0.01 mi	0	0	0	0.25 mi	0.12 mi	0.09 mi	0.47 mi
Residential	0	0	0	0	0.05 mi	0	0	0.05 mi
Forest	0	0	0	0.19 mi	0.05 mi	0	0	0.24 mi
Range	9.13 mi	7.75 mi	8.58 mi	24.88 mi	10.11 mi	14.44 mi	27.05 mi	101.94 mi
Agricultural	0	0	0	0.01 mi	1.07 mi	0.48 mi	0.39 mi	1.95 mi
Water	0	0.03 mi	0.03 mi	0.02 mi	0.26 mi	0.38 mi	0.59 mi	1.31 mi
Total Distance	9.14 mi	7.78 mi	8.61 mi	25.10 mi	11.79 mi	15.42 mi	28.12 mi	105.96 mi

3.7.2.3 Aircraft Uses

Three airports were identified within the study area by segment (Table 3.7-7, *Airports within the Project Study Area*). None of the airports are located directly within the study corridors of the segments.

Table 3.7-7
Airports within the Project Study Area

Airport Name	Closest Segment	Approximate Location with Respect to Segment
Yakima Training Center	A, B, C	Segments cross areas where military flights take place during training exercises
Mattawa Airstrip	E	T14N, R25E, Sec 5
Christensen Brothers Wahluke Strip	D	T14N, R24E, Sec 10 & 15

Although outside of the study area, the Bowers Field Airport in Ellensburg is located approximately five miles south of the Vantage substation. The Bowers Field Airport utilizes the area for flight instruction, local general aviation, and transient general aviation.

In addition to the use of the airspace in the study area by commercial and private aircraft, the U. S. Army utilizes the airspace over the Yakima Training Center (YTC) for military training flights and support of ground maneuvers. During Fiscal Year 2001 (October 2000 – October 2001), the Army indicates there were 1,462 flights across the YTC. They expect this number to increase in the future.

3.7.3 Segment A

Segment A, approximately 29.4 miles, would be located entirely within Kittitas County and, as shown in Table 3.7-2, *Private and Publicly Administered Lands in Project Area*, would cross privately owned lands (roughly 69 percent of the segment) as well as publicly administered lands (roughly 31 percent).

3.7.3.1 Private Land

Rangeland is the predominate private land use along Line Segment A; approximately 18.8 miles of the 20 miles of private land crossed by the segment. Less than one-half mile of each of the following land uses — commercial, industrial and transportation, forest, and agricultural — would be crossed by this segment.

➡ For Your Information

A **steppe** habitat is a grass-dominated community found in arid areas

A **shrub-steppe** habitat is a shrub and grass dominated community found in arid areas.

The rangeland is used for raising and grazing livestock and is predominately **steppe** and **shrub-steppe** over varied terrain consisting of numerous ridges and valleys that traverse the eastern side of Kittitas County.

Farm and agricultural uses are typified as dryland agricultural operations. The predominant crops are hay or wheat.

Vacation homes, and people seeking a rural lifestyle are increasing the residential development in the study area. Table 3.7-4, *Distance of Private Land Uses Crossed by Project Area*, does not reflect the presence of residential land uses along this segment because the land on which these residences are located is designated for rangeland or agricultural purposes; however, residential land uses are permitted in the area with minimum lot sizes of 20 acres.

Mineral resource lands of long-term commercial significance are not specifically zoned along the segment but have been identified on a Kittitas County Comprehensive Plan map. The Study area crosses an existing quarry operation along the south side of an existing transmission line.

There are some limited forest resources in the study area. However, these areas are not considered harvestable timber resources (Neil White, Kittitas County Planning Director, April 2001).

3.7.3.2 Public Land

Public land crossed by this segment is under the administration of one state agency, DNR, and three federal agencies, BLM, DOD, and BOR. Table 3.7-2, *Private and Publicly Administered Lands in Project Area*, provides the distance Segment A would cross these public lands (9.14 miles), and Table 3.7-6, *Distance of Public Land Uses Crossed by Project Area*, shows that the primary use of these public lands is rangeland (9.13 miles of the segment's 9.14 miles) on public lands.

Land Use along the reroute in Segment A consists primarily of private lands (96%). Public land (BLM) makes up the remainder of the land use for this segment (4%). Land use for the portion of the route through the tribal allotment consists of 91% private lands and 9% (BLM) public land.

DNR Lands – The majority of DNR lands crossed by the study area are located along the northern half of the line segment. This land is considered transition land by DNR and is designated as agricultural land. However, the land is managed for its highest and best use and for this particular area that use is rangeland.

BLM Lands – The BLM land along Segment A is used as rangeland and would support the land use activities consistent with this type of land at other locations along the other segments.

DOD Lands (YTC) – The largest area of federal land crossed by the study area is the YTC (5.6 miles). A U.S. military reservation, this area is administered by the U.S. DOD and is a sub-installation of Fort Lewis. The total size of the YTC is 511.64 square miles; split roughly in half between Kittitas and Yakima Counties.

The YTC is divided into 10 different watershed complexes and 5 different land use zones. Military training exercises vary according to the land use zones within the specific complexes and certain maneuvers in one complex may not be present in the same land use zone in a different complex.

Segment A would cross the northern border of the YTC and continue south through the Middle Canyon Complex ending just inside the Johnson Creek Complex; completely within Kittitas County. The segment crosses three land use zones; Land Bank Zone, General Use Zone (slopes 0 to 15 percent), and General Use Zone (slopes > 15 percent). Typical training maneuvers in the study area consist of armor and mechanized infantry movements, firing exercises, tanks and other vehicle movements, and military training exercises.

Non-military land uses within the YTC include **Native American traditional cultural practices** by the Yakama Indian Nation and the Wanapum Band as well as limited recreational hunting and other outdoor activities.

Prime Farmlands – As Table 3.7-3, *Land Uses Crossed by Each Line Segment*, indicates, Segment A would cross a total of approximately 0.53 mile of agricultural lands. Along the north side of the existing transmission line roughly 0.2 mile of **prime farmland** would be crossed by this segment. Prime farmlands, therefore, make up roughly 38 percent of the total agricultural lands crossed by this segment.

→ Reminder

A **complex** is a specific watershed area within the YTC. The YTC is divided into ten complexes.

→ For Your Information

Native American traditional cultural practices can include gathering plants and roots for medicinal use and religious ceremonies.

Prime Farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, livestock, timber, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and/or labor. It does not include land already in or committed to urban development or water storage. (USDA, NRCS web page)

The lists of unique, statewide, and locally important farmlands in Washington are in the process of being updated. They are not discussed in this document.

3.7.4 Segment B

Options B_{NORTH} and B_{SOUTH} are different in length, but cross the same types of lands and are discussed together.

3.7.4.1 Private Lands

Approximately 1.75 miles of Options B_{NORTH} and B_{SOUTH} would be located on lands not under the administration of a public agency. Of this amount, roughly two-thirds of this land is used as rangeland, with the Columbia River crossing, or open water, comprising all but 0.01 mile of the remaining portion.

The rangeland supports livestock activities and is predominately steppe and shrub-steppe over varied terrain, consistent with the rangeland activities and terrain along all other segments.

3.7.4.2 Public Lands

Public land crossed by this segment is under the administration of one state agency, DNR, and two federal agencies, DOD and BOR. Table 3.7-2, *Private and Publicly Administered Lands in Project Area*, provides the distance Option B_{NORTH} and B_{SOUTH} would cross these public lands (9.53/10.36 miles). Table 3.7-6, *Distance of Public Land Uses Crossed by Project Area*, shows that rangeland is the predominate land use.

DNR Lands – A very small portion of Option B_{NORTH} and B_{SOUTH} would cross DNR administered lands. The use of these lands is for the John Wayne Trail. Further discussion of this trail can be found in Section 3.10, *Recreation Resources*, of this document.

DOD Lands (YTC) – The majority of Options B_{NORTH} and B_{SOUTH} (roughly 76 to 78 percent of each option respectively) would be located within the YTC. Both options would traverse the Johnson Creek Complex and two land use zones, General Use Zone (slopes 0 to 15 percent) and General Use Zone (slopes > 15 percent), before exiting the YTC along its eastern border.

Tanks and other vehicle movements, as well as training exercises take place within the Johnson Creek Complex.

BOR Lands – Options B_{NORTH} and B_{SOUTH} also cross BOR lands. These lands are administered and managed to maintain and develop water distribution systems, such as irrigation canals, that move water to the fertile agricultural lands of the area.

3.7.5 Segment C

3.7.5.1 Private Lands

Segment C would cross privately owned lands in a scarcely populated area between the YTC in Yakima County and the new substation site in Benton County (Wautoma Substation). There is no private land crossed by Segment C in Kittitas County.

The area is within the Blackrock Valley and its terrain is gently rolling hills at the foot of the Saddle Mountains Range. While some parts of this area are used for dryland agriculture, the main use of the area that would be crossed by Segment C is rangelands.

In Benton County, Segment C would cross land that is sparsely inhabited rural-agricultural land. The landscape is characterized by rolling hills cut by drainages from the Saddle Mountains Range. As in Yakima County, the area is more commonly used for rangeland instead of agricultural purposes.

None of the agricultural land is designated as prime farmland.

3.7.5.2 Public Lands

Public land crossed by this segment is under the administration of one state agency, DNR, and two federal agencies, BLM and DOD. Table 3.7-2, *Private and Publicly Administered Lands in Project Area*, shows that Segment C would cross 25.11 miles of public lands. Table 3.7-6, *Distance of Public Land Uses Crossed by Project Area*, shows that the predominate land use is rangeland.

DNR Lands – A small portion of Segment C would cross DNR administered lands (0.45 mile). This land is at the northern end of the segment where the John Wayne Trail is crossed, and near the southern end of the segment. The DNR land at the southern end is used as rangeland.

DOD Lands (YTC) – The majority of Segment C (roughly 82 percent) would be located in the YTC. The segment would traverse three land use zones, Land Bank Zone, General Use Zone (slopes 0 to 15 percent) and General Use Zone (slopes > 15 percent) and five watershed complexes, Johnson Creek, Hanson, Alkali Canyon, Corral Canyon, and Cold Creek.

The land use activities in Johnson Creek would be the same as those describe for Segment B.

The military conducts ground maneuvers, live fire artillery, mortar training, and water exercises within the Hanson Complex.

➡ For Your Information

For this document, agriculture is defined as row crops, pasture, fallow fields, orchards, crops and grains. Land that we refer to as rangeland is grassland and shrubland that may be used for grazing or the movement of livestock.

➡ Reminder

See Map 7, Land Ownership, for location of the John Wayne Trail.

Live fire training for the infantry, tanks, and helicopters as well as light infantry maneuvers and small unit operations are conducted within the Alkali Canyon and Corral Canyon Complexes. Due to the steep slopes in these two complexes, parachute drops are used to deliver supplies to the infantry.

Cold Creek Complex supports track vehicle and light infantry maneuvers.

Throughout these complexes low flying aircraft such as helicopters, F-18s and A-10s are used to support the ground maneuvers.

3.7.6 Line Segment D

3.7.6.1 Private Lands

Segment D would cross 7.78 miles of private agricultural lands. This is the largest amount of agricultural lands crossed by any of the line segments. The segment would also cross 7.21 miles of rangeland. The segment would cross less than one-half mile of each of the following land uses: commercial, industrial and transportation, residential, forest, and water.

Reminder

See Map 9, Land Use Cover.

About 29 percent of the land along the segment is privately owned land used for agricultural purposes. The agricultural areas are composed mainly of irrigated lands with highly productive soil that is generally suited to crops, such as grains and vegetables, agricultural-related industries, and livestock maintenance. Vineyards and orchards are also present along the segment.

Dryland agricultural practices also occur along the study area for Segment D. Dryland agricultural land is primarily for grain or feed crop production.

As Table 3.7-3, *Land Uses Crossed by Each Line Segment*, indicates, Segment D would cross 8.85 miles of agricultural land, roughly 2.7 miles of which are designated as prime farmland. There is 0.9 mile in Grant County and 1.8 miles in Benton County. Prime farmlands make up about 31 percent of the total agricultural lands crossed by this segment.

Private rangeland accounts for approximately 26 percent of the lands crossed by this line segment. This land is used for livestock and is predominately steppe and shrub-steppe over varied terrain.

The remaining portions of this segment would cross areas of Grant County that have been designated as rural in nature. Such areas are those not suitable for intensive farming and generally do not attract large residential development. Some areas near the western end of

Crab Creek have been designated as open space, which further limits the ability to develop the land.

Limited rural-residential structures are also located along the segment. Maximum residential density in the rural areas of Grant County is one dwelling unit per 20 acres.

3.7.6.2 Public Lands

Public lands crossed by this segment are under the administration of one state agency, DNR, and four federal agencies, BLM, BOR, USFWS, and USDOE. Table 3.7-2, *Private and Publicly Administered Lands in Project Area*, provides the distance Segment D would cross these public lands (11.79 miles) and Table 3.7-6, *Distance of Public Land Uses Crossed by Project Area*, shows that the predominate land use is rangeland (10.11 miles) and 1.6 miles of the public lands are agricultural, commercial, industrial and transportation, residential, and open water.

DNR Lands – DNR lands would be crossed by Segment D (2.08 miles) in Grant County and Benton County. In Grant County this land is managed for agricultural purposes and in Benton County it is used as rangeland.

BLM Lands (Saddle Mountains Management Area) – Roughly 2.87 miles of BLM land would be crossed by this segment. This BLM land is located north of the agricultural areas in Grant County and is the western end of the Saddle Mountains Management Area. This land is managed for multiple purposes, such as mining, rangeland, recreation, and wildlife habitat.

BOR Lands – The BOR lands that would be crossed by this segment are located at the north end of the segment and along the south face of the Saddle Mountains. These lands are administered and managed to maintain and develop the water distribution system, such as irrigation canals, that move water to the fertile agricultural lands of the area.

USFWS Lands (Columbia National Wildlife Refuge) – Segment D would cross the westernmost part of the Columbia National Wildlife Refuge near Crab Creek. This area is an isolated $\frac{3}{4}$ of a Section between Crab Creek and the base of the Saddle Mountains. This land is managed for wildlife habitat.

USDOE Lands (Hanford Site and Hanford Reach National Monument) – Map 7, *Land Ownership*, illustrates the boundaries of the Hanford Site and its management units. The Hanford Reach National Monument is also shown on Map 7, *Land Ownership*. The land crossed on the Hanford Site is made up of large tracts of land

originally used by the USDOE as a protective buffer zone for safety and security purposes. The area remains largely undisturbed, preserving a biological and cultural resource setting unique in the Columbia Basin region.

The Hanford Reach National Monument forms a C-shaped region bisected by the Hanford Reach of the Columbia River. The lands within the monument are divided into three major management units: Fitzner-Eberhardt Arid Lands Ecology Reserve, Saddle Mountains Unit, and the Columbia River Islands.

Segment D crosses the far western part of the Saddle Mountains Unit of the Hanford Reach National Monument and has a land use designation of Preservation.

3.7.7 Segment E

3.7.7.1 Private Lands

Agricultural lands and rangeland make up about 98 percent of the private land uses crossed by Segment E, 4.29 miles and 3.92 miles, respectively. The remaining 2 percent would cross open water.

The agricultural lands and rangelands are used for the same purposes as described above for Segment D.

As Table 3.7-3, *Land Uses Crossed by Each Line Segment*, indicates, Segment E would cross 5.87 miles of agricultural lands, roughly 2.7 miles, which are designated as prime farmlands and which are all located in Grant County. Prime farmlands make up about 46 percent of the total agricultural lands crossed by Segment E.

3.7.7.2 Public Lands

Public lands crossed by this segment are under the administration of one state agency, DNR, and four federal agencies, BLM, BOR, USFWS, and USDOE. Table 3.7-2, *Private and Publicly Administered Lands in Project Area*, provides the distance Segment E would cross these public lands (15.42 miles) and Table 3.7-6, *Distance of Public Land Uses Crossed by Project Area*, shows that the predominate land use is rangeland (14.44 miles) and approximately 1 mile of the public lands are agricultural, commercial, industrial and transportation, and open water.

DNR Lands – Segment E would cross roughly 0.56 mile of DNR lands that are located north of the Wahluke Slope in Grant County. This land is managed for agricultural purposes.

BLM Lands (Saddle Mountains Management Area) – BLM lands that would be crossed by Segment E are the western portion of the Saddle

Mountains Management Area. It is managed by BLM for multiple purposes, such as mining, rangeland, recreation, and wildlife habitat.

BOR Lands – The BOR lands crossed by this segment support the same land uses as those described above for Segment D.

USFWS Lands (Columbia National Wildlife Refuge) – Segment E would cross the westernmost part of the Columbia National Wildlife Refuge near Crab Creek. This area is an isolated $\frac{3}{4}$ of a Section between Crab Creek and the base of the Saddle Mountains. This land is managed for wildlife habitat.

USDOE Lands (Saddle Mountains Unit of the Hanford Reach National Monument and Hanford Site) – A general description of the USDOE lands has been provided above for Segment D.

Segment E, however, would cross through the Saddle Mountains Unit portion of the Wahluke Slope before crossing the Columbia River and terminating on the Hanford Site.

The Saddle Mountains Unit is managed by the USFWS under an agreement with the USDOE. The area is uninhabited wildlife habitat that has remained largely undisturbed since the 1940's. It has a land use designation of Preservation and is managed for the preservation of archaeological, cultural, ecological, and natural resources.

This segment ends at the Hanford Substation, which is approximately one-quarter mile from the Columbia River. The area within one-quarter mile of the Columbia River has a land use designation of Preservation; beyond one-quarter mile, the land use designation is Industrial. The area to the northeast of the termination site of this segment is currently used by the USDOE as an operating and facilities area. The remaining surrounding area is open rangeland.

3.7.8 Segment F

Segment F, approximately 32.06 miles, would be located within Grant and Benton Counties and, as shown in Table 3.7-2, *Private and Publicly Administered Lands in Project Area*, would cross privately owned lands (roughly 12 percent of the segment) as well as publicly administered lands (roughly 88 percent).

3.7.8.1 Private Lands

All the private land crossed by this segment is open rangeland or rangeland used for raising and grazing of livestock (4.03 miles). No privately owned agricultural areas would be crossed.

3.7.8.2 Public Lands

Public lands crossed by this segment are under the administration of two state agencies, DNR and WDFW, and three federal agencies, BLM, BOR, and the USDOE. Table 3.7-2, *Private and Publicly Administered Lands in Project Area*, provides the distance Segment F would cross these public lands (28.11 miles) and Table 3.7-6, *Distance of Public Land Uses Crossed by Project Area*, shows that the predominate land use is rangeland (27.05 miles) and approximately 1 mile of the public lands are agricultural, commercial, industrial and transportation, and open water.

DNR Lands – Segment F would cross roughly 2.5 miles of DNR lands that are located intermittently along the segment on the north and south side of the Saddle Mountains. These lands are managed for agricultural and rangeland purposes.

WDFW Lands – Roughly 0.8 mile of WDFW administered lands would be crossed by this segment. These lands are managed for rangeland purposes and are typical of the shrub-steppe lands of the area.

BLM Lands (Saddle Mountains Management Area) – The largest amount of public lands that would be crossed by this segment, nearly 40 percent of the total segment or 12.77 miles, would be the Saddle Mountains Management Area administered by the BLM. Unlike Segments D and E that would cross only the western end of the management area, Segment F would cross east and west through the majority of the area. As a result, nearly all the multiple land uses of the area, such as rangeland, recreation, and wildlife habitat, would be crossed by the segment.

BOR Lands – The BOR lands crossed by this segment support the same land uses as those described above for Segment D.

USDOE Lands (Saddle Mountains Unit of the Hanford Reach National Monument and Hanford Site) – The majority of this segment would cross the Saddle Mountains Unit in a different location than Segment E. The land uses along Segment F are different than those for Segment E, since Segment F crosses the former Wahluke Slope Wildlife Recreation Area, which has been and continues to be open to public access.

Also, since Segment F would cross the Columbia River and terminate at the same location as Segment E, the land uses present on the Hanford Site (south of the Columbia River) would be the same as for Segment E.

3.8 Socioeconomics

The rural character of central Washington is linked to the local socioeconomics. Agriculture is an important industry sector that influences local economies as well as demographic composition. Correspondingly, the booms and busts of agricultural dependent industries are reflected in population and economic growth of the area. Other industries important to the area include service, retail trade, and manufacturing sectors. Kittitas, Grant, Yakima, and Benton counties, in general, are less racially diverse, have lower per capita and median household incomes, and have a lower percentage of income derived from work earnings than the state.

In Kittitas County, the study area is comprised of rural-agricultural and grazing land uses on private lands and military exercises at the YTC. Segment A is mostly contained within the YTC with a small portion crossing private, undeveloped shrub-steppe lands. Segments that cross Grant County comprise a mix of developed agricultural and grazing lands, undeveloped private lands, BLM- and DNR-administered lands, and the Saddle Mountains Unit of the Hanford Reach National Monument. Benton County is crossed by segments on the Hanford Site as well as on private lands that are a mix of grazing or undeveloped lands. (See Section 3.7, *Land Use*, for more detail.)

3.8.1 Population

The population within the study area is primarily located in sparsely populated rural areas. In Grant and Kittitas counties, population densities per square mile are 26.7 and 14.2, respectively, compared to the statewide density of 87.2 per square mile. These densities are representative of the portions of private lands in Grant and Kittitas counties within the study area and are similarly representative of the private lands crossed in Benton and Yakima counties. Public lands are predominantly uninhabited in the study area. Over half the population of Grant and Kittitas counties live in rural areas. Similarly, the study area within Benton and Yakima counties lies within rural areas, which are considerable distances away from the cities of Yakima, Richland, and Kennewick. No urban areas lie within the study area. Nearby population centers include Ellensburg (estimated population 14,340) and Mattawa (estimated population 1,955). (Data sources include the U.S. Census Bureau, 1990 Census of Population and Housing, Washington, D.C., and the Washington State Office of Financial Management. 2000. Population Trends. Olympia, WA).

➔ For Your Information

For socioeconomic considerations the study area is defined as the proposed ROW boundaries of the line segments, as well as nearby adjacent lands.

Data sources for population statistics included in this section include the Washington State Office of Financial Management and the U.S. Census Bureau. Estimates for 2000 statistics are used unless otherwise noted.

Caucasians comprise approximately 95 percent of the total population in Benton, Grant, and Kittitas counties. With a minority population of 11 percent, Washington State is more diverse than these counties. In Yakima County, however, Native Americans form 7 percent and Caucasians form 88 percent of the population. Hispanic origin varies greatly across the area: 11 percent of Benton County, 27 percent of Grant County, 5 percent of Kittitas County, and 37 percent of Yakima County as compared to a statewide composition of 6 percent.

Washington State has experienced steady population growth over the last fifty years, averaging nearly 20 percent increases each decade. Population growth within the study area, however, has not been as stable or positive (Table 3.8-1, *Population Growth for Washington State and Affected Counties, 1950-2000*). The fluctuation in county populations tends to be linked to boom and bust cycles of natural resource dependent economies as well as the policies associated with the Hanford Site in Benton County.

Table 3.8-1
Population Growth for Washington State and Affected Counties,
1950-2000

Year	Washington State		Benton County		Grant County		Kittitas County		Yakima County	
	Pop.	Percent Change	Pop.	Percent Change	Pop.	Percent Change	Pop.	Percent Change	Pop.	Percent Change
1950	2,378,963	—	51,370	—	24,346	—	22,235	—	135,723	—
1960	2,853,214	19.9	62,070	20.8	46,477	90.9	20,467	(8)	145,112	6.9
1970	3,413,244	19.6	67,540	8.8	41,881	(9.9)	25,039	22.3	145,212	0.1
1980	4,132,353	21.1	109,444	62.1	48,522	15.9	24,877	(0.7)	172,508	18.8
1990	4,866,663	17.8	112,560	2.9	54,798	12.9	26,725	7.4	188,823	9.5
2000	5,803,400	19.3	140,700	25	71,500	30.5	32,500	21.6	214,000	13.3

Source: Washington State Office of Financial Management (2000)
U.S. Census Bureau (2000)

➡ For Your Information

Data sources for economic statistics include the Washington State Employment Security Department and the U.S. Bureau of Economic Analysis. Estimates for 1998 statistics are used unless otherwise noted.

3.8.2 Economy

The service, retail trade, manufacturing, and agriculture sectors drive the central Washington economy in the private industry.

Employment and income derived from government and government services also plays a major role in the local economies. In Grant and Kittitas counties, government provides 20 percent and 33 percent, respectively, of the local jobs compared to 18 percent at the state level. The value of these government jobs is critical to these counties in terms of the percent of total wage and salary earnings: 27 percent for Grant County and 46 percent for Kittitas County, compared to 19 percent for the state. Benton and Yakima counties have a slightly lesser proportion of government jobs (16 percent and 14 percent, respectively) and a slightly higher proportion of income derived from this sector (19 percent and 20 percent) than the state as a whole.

Per capita incomes in the study area are substantially lower than the \$28,719 statewide average: \$24,315 for Benton County; \$20,301 for Grant County; \$20,241 for Kittitas County; and \$20,718 for Yakima County. With the exception of Benton County, the lower per capita incomes in this area are evidence of the loss of high-paying jobs and the restructuring of resource-based industries trend throughout the Pacific Northwest since the 1980's. Benton County has a higher reliance on the high wages earned through the utilities sector, primarily those associated with the Hanford Site, to offset resource-based recessions.

Kittitas County has the lowest median household income (\$26,770) compared to \$30,979 in Grant County, \$31,522 in Yakima County, and \$44,219 in Benton County. All study area counties are lower than the state median household income of \$46,080.

Earnings account for a lesser portion of local residents' income in Grant County (68 percent), Kittitas County (58 percent), and Yakima County (64 percent) than the state (72 percent). Benton County is slightly higher (74 percent). Kittitas County residents report a higher income received from dividends, interest and rent (24 percent) compared to the state (19 percent). This may indicate that a higher proportion of retired or semi-retired people reside in Kittitas County. Benton, Grant, and Yakima counties have lower percentages of this income than the state.

Transfer payments in Benton County (13 percent) are comparable to the state (12 percent). Grant, Kittitas, and Yakima counties, however, are substantially higher at 18 percent, 17 percent, and 19 percent, respectively. Higher levels of income from transfer payments and dividends, interest and rent in Kittitas County is indicative of a higher proportion of retired and semi-retired population compared to other counties and the state.

Agriculture is an important sector for Grant and Yakima counties. In Grant County, agriculture provides one out of four jobs; in Yakima County, it provides one out every five jobs. Wages, though, are relatively less than other industries. Jobs in agriculture account for 16 percent of the wage earnings in Grant County and 13 percent of the wage earnings in Yakima County. Agriculture is less important in Benton County and Kittitas County (4 percent and 5 percent of the total earned wages, respectively).

Unemployment rates within the study area vary dramatically. The average unemployment rate for the state in 2000 was 4.8 percent, whereas Benton County was 5.9 percent, Grant County was 9.3 percent, Kittitas County was 5.3 percent, and Yakima County was 9.8 percent. The higher rates are likely associated with the seasonal work

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The data source for tax information is the Washington State Department of Revenue. Tax rates indicated are for 2000 unless otherwise noted.

Excise taxes are internal taxes imposed on the production, sale, or consumption of a commodity or the use of a service.

periods in the agricultural sector, which is a primary employer in Grant and Yakima counties.

3.8.3 Taxes

The State of Washington relies on a variety of taxes to fund state and local government programs. These taxes include a combined state and local sales and use tax, a business and occupation tax and public utility tax, property tax, and several other **excise**, real estate, and estate taxes.

3.8.3.1 Retail Sales and Use Tax

A combined state and local retail sales tax is collected on the sale of tangible personal property. A use tax is assessed on the value of personal property and services for which a sales tax has not been assessed. The retail sales and use tax applies to most items purchased by consumers, but does not apply to food items or prescription drugs. Utility services and most personal services (e.g., medical, dental, legal) and real estate are not subject to these taxes. However, construction services and building materials are subject to the retail sales tax.

The amount of the retail sales and use tax varies by locality. The state tax base is 6.5 percent, which each locality can assess 0.5 to 2.1 percent additional tax. Combined state and local tax rates for the study area range from 7.6 to 7.9 percent.

As a federal agency, BPA is not subject to Washington taxes (Dittrich, 2001). However, contractors performing work for the federal government are required to pay sales or use tax on all materials incorporated into the construction project. Contractors are also required to pay sales or use tax on all consumable supplies and tools used on the project (WAC 458-20-17001).

3.8.3.2 Business and Occupation Tax and Public Utility Tax

Most businesses operating in the state are subject to the business and operation (B&O) tax. However, power, water, and gas companies and carriers by air, water, rail, and motor are taxable under the public utility tax. The B&O tax is typically assessed on the gross income or proceeds of sales or the value for privilege of doing business. Contractors doing construction work for BPA are classified as government contractors for B&O tax purposes. Contractors are subject to the B&O taxes. Typically, the measure of tax is the gross contract price (WAC 458-20-17001).

The public utility tax is typically assessed on the gross operating revenue of public and privately owned public service firms (utilities). Tax rates are based on the classification of business and utility.

Utilities in the power business are taxed at a rate of 3.873 percent (Washington State DOR, 2000c). The utility tax is levied on the person making the final distribution within the state. If a non-federal entity makes a charge for transmission, that charge is subject to the utility tax. BPA, as a federal agency, is exempt from this tax (Dittrich, 2001).

3.8.3.3 Property Tax

Real and personal property is subject to property tax. Real property includes land and any improvements, such as buildings, attached to the land. The primary characteristic of personal property is mobility. Examples of personal property are machinery, equipment, supplies, and furniture. Personal property tax typically applies to personal property used when conducting business.

The property tax is a combined state and local tax. The state property tax rate is \$3.27 per \$1,000 of assessed property value (Washington State DOR, 2000c). Local tax rates vary depending on regular and special levies. The state average for local property tax rates is \$10.12 per \$1,000 assessed value (Washington State DOR, 2000c).

BPA acquires land rights (easements) from private property owners for building, operating, and maintaining transmission facilities with the exception of substations, which BPA acquires in fee. The easement rights are for a specific purpose, and the underlying property owner retains ownership of the property. Because the landowner retains ownership, the landowner continues to pay property tax on the entire parcel, including that within any BPA easement. Because BPA is a federal agency, and exempt from paying local property taxes, improvements owned by BPA, such as transmission facilities and any property acquired in fee for substations, would also be exempt.

BPA acquires land grants instead of easements from federal agency land managers. In the study area, federal lands include the Saddle Mountains Unit of the Hanford Reach National Monument, the Yakima Training Center, and the Hanford Site. Because federal land management agencies are also exempt from state and local property tax, no property taxes would be paid for the grants acquired on these federal lands.

3.8.3.4 Other Taxes

Various other taxes are assessed at the state levels, which include excise tax on fuels, tobacco products, liquor, timber, rental cars, and others. Other local excise taxes include hotel/motel taxes and municipal business taxes and licenses. The sale of most real property is subject to a real estate tax that is paid by the seller. Other taxes levied by the state or local municipalities include an estate and

transfer tax, vehicle licensing fee, and watercraft excise tax. No personal income tax is levied in the state of Washington.

3.8.4 Property Value

Real property is assessed a value by the local county assessor. This property value is referred to as the market value or assessed value, and is defined as the amount of money that a willing buyer would pay a willing seller in an arms length transaction, and neither of whom is under any unusual pressure to buy or sell.

Washington State law (RCW 84.52) requires assessors to appraise property at 100 percent of its true and fair market value in money, according to the highest and best use of the property (Washington State Department of Revenue, 1998). Each county assessor values real property using one or more of three professional appraisal methods:

- Market or sales comparison method uses sales to provide estimates of value for similar properties.
- Cost approach method considers what it would cost to replace an existing structure with a similar one that services the same purpose. The cost method is also used in valuing new construction.
- Income method is used primarily to value business property when the property tends to be worth its income-producing potential (Washington State Department of Revenue, 1998).

Property value is used to determine property tax. It is also used as one factor in determining the worth of the property if it is to be sold.

The only exceptions to the information cited above include Washington State law RCW 84.33 and RCW 84.34.

RCW 84.33 addresses the value for Forest land. These values are calculated rather than utilizing the market, cost or income approach to value. The factors affected value include species, stocking percentage, site index, and operability class.

RCW 84.34 addresses the value for Open Space. Two values are considered including the use value and the market value. Taxation is based on the use value, rather than the market value. These properties include agriculture, timber, and open space (a conservation type of category).